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PART 1

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WRITINGS OF ARCHÆOLOGY.

By Clarence B. Moore.

Certain Shell Heaps of the St. Johns River, Florida, hitherto unexplored. The American Naturalist, Nov., 1892, to Jany., 1894, inclusive. Five papers with illustrations in text, and maps.

Certain Sand Mounds of the St. Johns River, Florida, Parts I and II. Journal of the Academy of Natural Sciences of Philadelphia, Philadelphia, 1894. Vol. X. Quarto, 130 and 123 pages. Frontispieces, maps, plates, illustrations in the text.

Certain Sand Mounds of Duval County, Florida; Two Mounds on Murphy Island, Florida; Certain Sand Mounds of the Ocklawaha River, Florida. Journ. Acad. Nat. Sci. of Phila., 1895. Vol. X. Quarto, 108 pages. Frontispiece, maps, plates, illustrations in text.

Additional Mounds of Duval and of Clay Counties, Florida; Mound Investigation on the East Coast of Florida; Certain Florida Coast Mounds north of the St. Johns River. Privately printed, Philadelphia, 1896. Quarto, 30 pages. Map, plates, illustrations in text.

Certain Aboriginal Mounds of the Georgia Coast. Journ. Acad. Nat. Sci. of Phila., 1897. Vol. XI. Quarto, 144 pages. Frontispiece, map, plates, illustrations in text.

Certain Aboriginal Mounds of the Coast of South Carolina; Certain Aboriginal Mounds of the Savannah River; Certain Aboriginal Mounds of the Altamaha River; Recent Acquisitions; A Cache of Pendent Ornaments. Journ. Acad. Nat. Sci. of Phila., 1898. Vol. XI. Quarto, 48 pages. Frontispiece, maps, illustrations in text.

Certain Aboriginal Remains of the Alabama River. Journ. Acad. Nat. Sci. of Phila., 1899. Vol. XI. Quarto, 62 pages. Map, illustrations in text.

Certain Antiquities of the Florida West-Coast. Journ. Acad. Nat. Sci. of Phila., 1900. Vol. XI. Quarto, 46 pages. Maps, illustrations in text.

Certain Aboriginal Remains of the Northwest Florida Coast, Part I; Certain Aboriginal Remains of the Tombigbee River. Journ. Acad. Nat. Sci. of Phila., 1901. Vol. XI. Quarto, 100 pages. Maps, illustrations in text.

Certain Aboriginal Remains of the Northwest Florida Coast, Part II. Journ. Acad. Nat. Sci. of Phila., 1902. Vol. XII. Quarto, 235 pages. Maps, illustrations in text.

Certain Aboriginal Mounds of the Central Florida West-Coast; Certain Aboriginal Mounds of the Apalachicola River. Journ. Acad. Nat. Sci. of Phila., 1903. Vol. XII. Quarto, 136 pages. Maps, illustrations in text.

Sheet-copper from the Mounds is not Necessarily of European Origin. American Anthropologist, Jan.-March, 1903. Plates in text.

The So-called "Hoe-shaped Implement." American Anthropologist, July-Sept., 1903. Illustrations in text.

Aboriginal Urn-burial in the United States. American Anthropologist, Oct.-Dec., 1904. Plate.

A Form of Urn-burial on Mobile Bay. American Anthropologist, Jan.-March, 1905.

Certain Aboriginal Remains of the Black Warrior River [Moundville]; Certain Aboriginal Remains of the Lower Tombigbee River; Certain Aboriginal Remains of Mobile Bay and Mississippi Sound; Miscellaneous Investigation in Florida. Journ. Acad. Nat. Sci. of Phila., 1905. Vol. XIII. Quarto, 206 pages. Maps, illustrations in text.

Moundville Revisited; Crystal River Revisited; Mounds of the Lower Chattahoochee and Lower Flint Rivers; Notes on the Ten Thousand Islands, Florida. Journ. Acad. Nat. Sci. of Phila., 1907. Vol. XIII. Quarto, 144 pages. Maps, illustrations in text.

Certain Mounds of Arkansas and of Mississippi (including Doctor Hrdlička's paper on the Crania). Journ. Acad. Nat. Sci. of Phila., 1908. Vol. XIII. Quarto, 130 pages. Maps, illustrations in text, eight colored plates.

Antiquities of the Ouachita Valley. Journ. Acad. Nat. Sci. of Phila., 1909. Vol. XIV. Quarto, 170 pages. Maps, illustrations in text, eight colored plates. (In addition in this number is Doctor Hrdlička's paper on the skeletal remains.)

Antiquities of the St. Francis, White, and Black Rivers. Journ. Acad. Nat. Sci. of Phila., 1910. Vol. XIV. Quarto, 112 pages. Maps, illustrations in text, twenty colored plates.

Some Aboriginal Sites on Mississippi River. Journ. Acad. Nat. Sci. of Phila., 1911. Vol. XIV. Quarto, 116 pages. Map, illustrations in text, eight colored plates.

Some Aboriginal Sites on Red River. Journ. Acad. Nat. Sci. of Phila., 1912. Vol. XIV. Quarto, 163 pages. Map, plans, illustrations in text, eight colored plates.

Some Aboriginal Sites in Louisiana and in Arkansas

Atchafalaya River, Lake Larto, Tensas River, Bayou Maçon, Bayou D'Arbonne, in Louisiana; Saline River, in Arkansas

BY

CLARENCE B. MOORE

A Report on a Collection of Crania and Bones from Sorrel Bayou, Iberville Parish, Louisiana

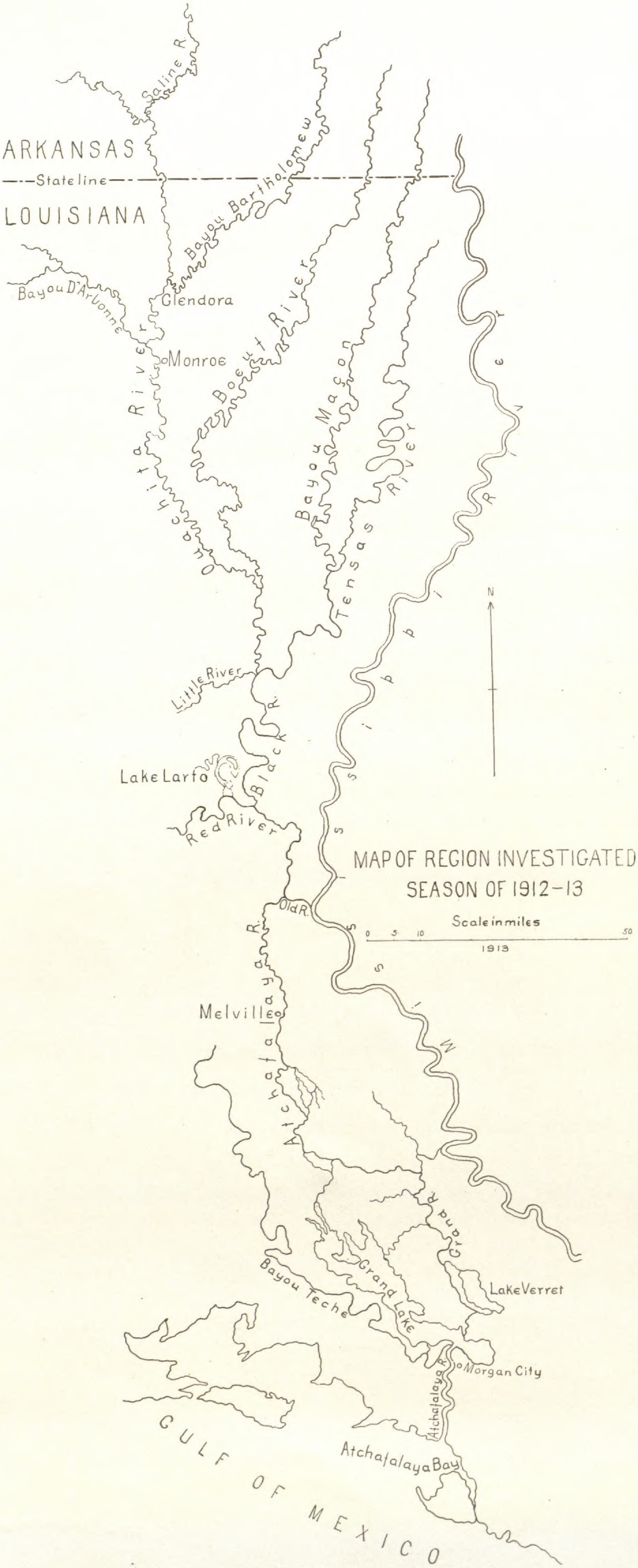
BY

DR. A. HRDLIČKA

Curator, Division of Physical Anthropology, United States National Museum

PHILADELPHIA

1913



ARKANSAS
State line
LOUISIANA
Saline R.
Bayou Bartholomew
Bayou D'Arbonne
Glendora
Monroe
Ouachita River
Boeuf River
Bayou Macon
Tensas River
Mississippi River
Little River
Black R.
Lake Larto
Red River
MAP OF REGION INVESTIGATED
SEASON OF 1912-13
Scale in miles
0 5 10 50
1913
N
Old R.
Atchafalaya R.
Melville
Grand R.
Lake Verret
Bayou Teche
Grand Lake
Morgan City
Atchafalaya R.
Atchafalaya Bay
GULF OF MEXICO

SOME ABORIGINAL SITES IN LOUISIANA AND IN ARKANSAS.

(Atchafalaya River, Lake Larto, Tensas River, Bayou Maçon, Bayou D'Arbonne, in Louisiana; Saline River, in Arkansas.)

By Clarence B. Moore.

Introduction.

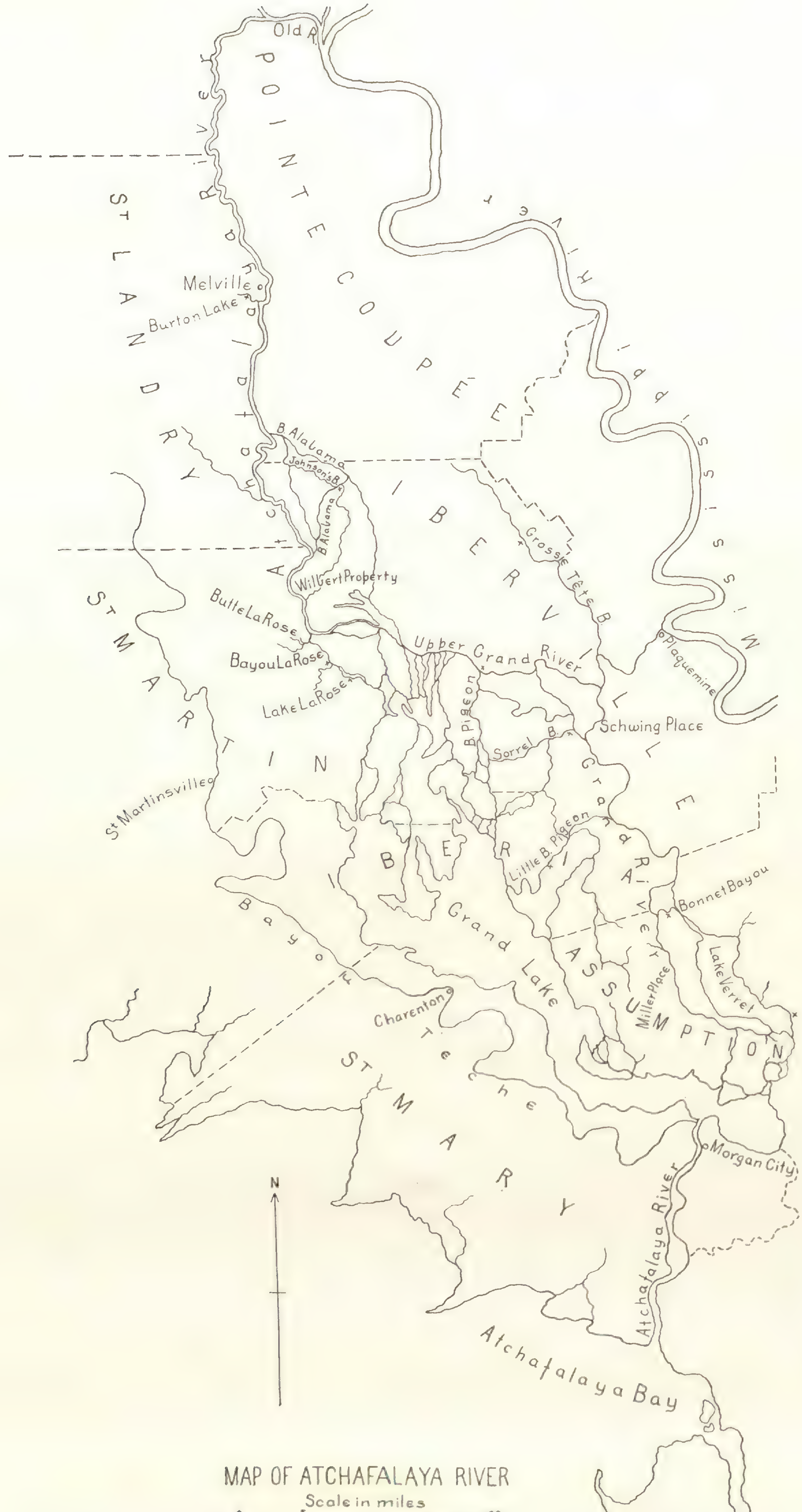
Our archæological investigation, this season, occupied parts of November and December, 1912, of January and April, 1913, and all February and March, 1913, one hundred and thirty days in all, and embraced portions of Atchafalaya river, of Lake Larto, of Tensas river, of Bayou Maçon, of Bayou D'Arbonne, all in the state of Louisiana, and a portion of Saline river, in the state of Arkansas.

The investigation of these regions, which hitherto, in the main, were unknown from an archæological point of view, proved rather an unproductive task. This result was not unexpected, as our agents, who had conducted a search in advance, had reported unfavorably on nearly all the various localities, and as, in addition, we fully realized that unsatisfactory conditions would, of necessity, be imposed upon us in this territory, most of which is subject to overflow, where the destruction or the impairment of mounds is not permissible. Nevertheless, these various localities seemed to call for investigation owing to their geographical relation to our former work.

As we have had occasion to explain in earlier reports, our investigation is accomplished by the use of a steamer of light draught as headquarters, in which men and material readily can be transported. The use of a steamer in this connection, however, is open to serious objection, since one's effort is limited to navigable water; but, on the other hand, a far greater amount of work can be accomplished in this way, and this is of vital importance since, in the United States, aboriginal remains are constantly being destroyed, and with deplorable speed, by treasure-seekers, relic-sellers, and by cultivation, while the number of those engaged in legitimate research in the field is very limited.

In order still further to facilitate the work, it is our invariable custom to have such territory as seems to offer opportunities for investigation, visited in advance, in order that, if a favorable decision as to its desirability is reached, the location of mounds and cemeteries may be determined and permission to investigate may be obtained.

The regions investigated by us this year had been carefully searched and reported on in part by Capt. J. S. Raybon, and partly by Capt. W. D. Platt, who, as a rule, with companions, visited all the localities in small boats in summer seasons, making careful inquiries as they went.



MAP OF ATCHAFALAYA RIVER

Scale in miles

0 5 20

1913

Both these gentlemen had been with us in some of our investigations and were fully conversant with the nature of our work. Captain Platt subsequently commanded our steamer throughout the season.

Dr. M. G. Miller, this season, accompanied the expedition as anatomist, as has been the case in all our previous archæological investigations, and has aided in putting this report through the press.

Mr. S. G. Weir was present as assistant for the third time and aided the expedition in various ways.

The thanks of the Academy are tendered: Dr. Aleš Hrdlička for his paper on the crania discovered by the expedition,[1] which appears at the end of this report; Prof. F. A. Lucas for determination as to bones of lower animals; Dr. H. A. Pilsbry for identification of shells; Mr. F. J. Keeley for determination of minerals and of rocks; Dr. H. F. Keller for chemical tests; Miss H. N. Wardle for aid with the index; and Mr. F. W. Hodge for literary revision of the report.

The Academy also warmly thanks all owners of properties who so courteously placed them at its disposal for investigation, and wishes to assure them that their kindness is most thoroughly appreciated.

All sites are described in order ascending streams or lakes, though the investigation was not always made in this way.

ATCHAFALAYA RIVER, LOUISIANA.

Atchafalaya river, in reality a continuation of Red river, leaves that stream eight miles[2] by water from where such waters of Red river as have not been diverted by the Atchafalaya, enter the Mississippi.

The Atchafalaya, after leaving Red river, follows a course southeasterly in the main, through the lower eastern part of that portion of the state of Louisiana that lies west of the Mississippi, and passing through part of the maze of lakes, bayous, and waterways found in that region, ultimately enters the Gulf of Mexico. In following this course, Atchafalaya river, at Butte La Rose, spreads into a swampy region intersected with bayous and lakes, and the name of the river temporarily is dropped, Upper Grand river and Grand river being usually considered as continuations of the Atchafalaya. The stream, however, comes together a few miles above Morgan City, and the name Atchafalaya is resumed, continuing on to the Gulf.

Atchafalaya river (under its various names) was searched in our behalf previous to our expedition by Capt. J. S. Raybon and a companion, from its junction with Red river to Morgan City, 148 miles by water.[3] In addition,

[1] Only seventeen crania were discovered, this season, in a condition to preserve. Sixteen of these came from the mound on Sorrel Bayou, in the Atchafalaya region, Louisiana, and one from a mound on Saline river, Arkansas.

[2] These eight miles are given the name Old river on some maps.

[3] All distances by water, of any importance, given in this report, are measured miles from United States Government maps.

Captain Raybon's search included many lakes and bayous connected with the river. No investigation was made by him of that part of Atchafalaya river below Morgan City, which flows mainly through marsh.

Our own investigation included all the river traversed by Captain Raybon, with the exception of several collateral sites, whose omission will be explained later in our account.

The Atchafalaya region is low-lying in the main, and inhabitants in parts of it, from whom inquiries can be made, are few. Consequently numerous sites, no doubt, remain unlocated, though such as were found most likely were representative.

In this region burials in mounds were numerous, but the custom to inter artifacts with the dead apparently was not practised.

Sites Investigated.

On the Miller Place, Assumption Parish.[1]
On Bonnet Bayou, Assumption Parish.
On Little Pigeon Bayou, Iberia Parish.
On Sorrel Bayou, Iberville Parish.
Near the Schwing Place, Iberville Parish.
Opposite Pigeon Bayou, Iberville Parish.
On Lake La Rose, St. Martin Parish.
On Bayou La Rose, St. Martin Parish.
On the Wilbert property, Iberville Parish.
On Bayou Grosse Tête, Iberville Parish.
On Alabama Bayou, Iberville Parish.
Near Melville, St. Landry Parish.

Mounds on Lake Verret, Assumption Parish.

At the lower end of Lake Verret are two mounds on property of Mr. Octave Delaune, reported by our agent who visited them, to be each about 6 feet in height and 60 and 40 feet in diameter, respectively.

Although permission had been obtained to investigate these mounds, an approaching flood made it inadvisable to do so.

Mound on the Miller Place, Assumption Parish.

This mound, or ridge, more correctly speaking, borders Grand river, on property of Mr. C. P. Miller, who resides on it. The ridge, which has great irregularity of surface, is about 40 paces in width. Its length is hard to determine, as it extends some distance at one end almost at the level of the surrounding ground. Roughly speaking, it may be said to be 250 yards long. Its maximum height, measured from the outside, is 4 feet 8 inches, but a trial-hole put down at this place did not reach undisturbed clay until 7.5 feet had been penetrated.

[1] Such divisions of the commonwealth as are termed counties in other states of the union are known as parishes in the state of Louisiana.

As this ridge was under cultivation at the time of our visit, and as its position above the surrounding level made any considerable digging in it undesirable, in view of the oncoming flood (April, 1913), we were restricted in our research. Various trial-holes showed the ridge, so far as we could determine, to be differently composed. Presumably, when of much less extent, the ridge, made up of midden material, including many broken shells, mostly *Rangia cuneata* (a clam), had been enlarged by the addition of clay. Consequently one had to dig but a short distance down in what had been the original ridge to reach the midden débris, while where the slopes had been and quantities of clay had been added to bring them to a general level, it was necessary to dig for several feet through clay before reaching the midden débris of the original slope.

Over the surface of the ridge lay shells, mostly in fragments. According to Mr. Miller, the owner of the place, much of the ridge, until recently, had been covered with a mass of these shells, which, later, had been towed away in barges to pave the town of Franklin on Bayou Teche. Mr. Miller said also that, when cultivating the ridge, many human bones had been plowed up, and in point of fact in all directions could be seen on the surface fragments of such bones. According to Mr. Miller, no artifacts had been found with the bones.

Several of our trial-holes came upon inconsiderable parts of skeletons, greatly scattered, which presumably were disturbances.

One trial-hole, that made in the highest part of the ridge, reached the upper surface of a burial at a depth of 14 inches. This burial was a deposit of bones, including one skull. In the same hole, 5.5 feet down, a skeleton of a young child was reached, with which was part of the skeleton of an adult, in anatomical order, of which the skull, and the bones of the arms and of the lower extremities below the knees, were missing.

On the surface of the ridge were found: various fragments of pottery, some marked with the imprint of a wooden stamp,[1] of a kind shown in Fig. 1; an

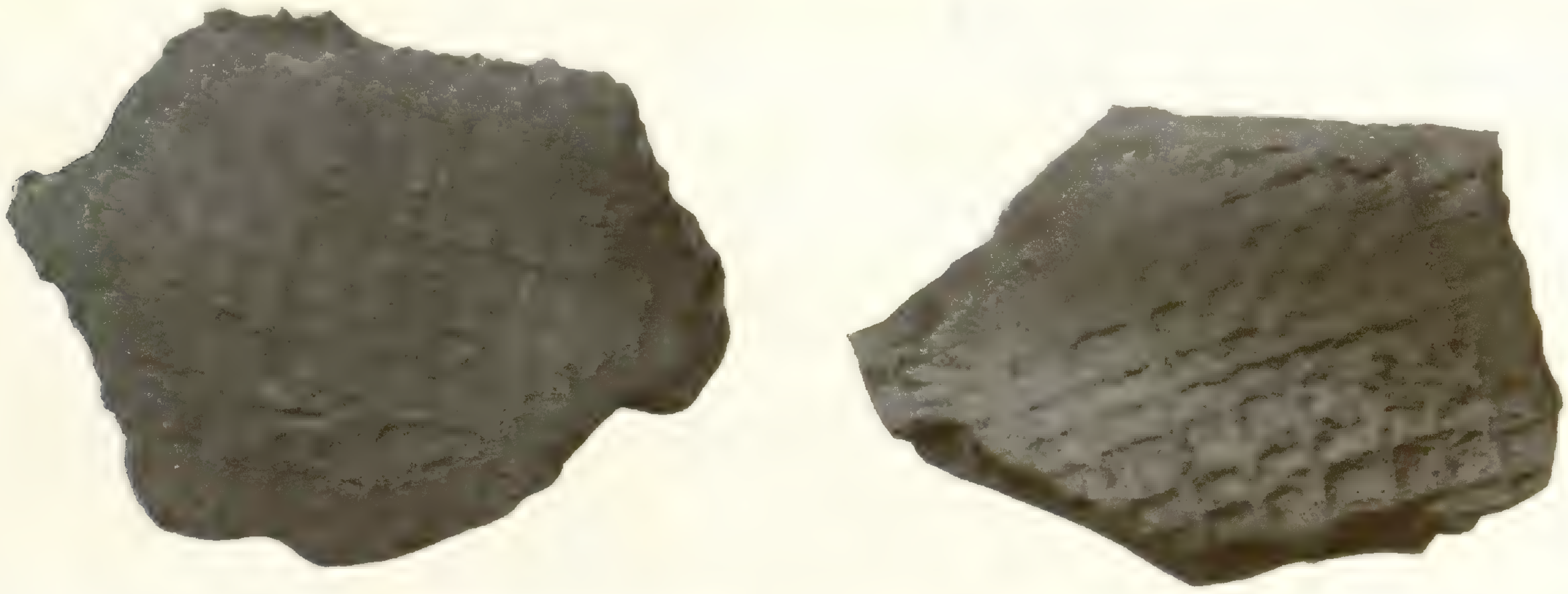


FIG. 1.—Fragments of earthenware with stamped decoration. (Full size.)

[1] We forwarded a fragment selected from a number bearing this decoration, from this region, to Prof. William H. Holmes, who kindly writes of it as follows:

arrowhead of red flint, slightly more than .5 inch in length, being a flake worked on one side only. There was picked up also an object of earthenware belonging to a class shown in Plate II. These objects, hitherto unreported, were found by us in various sites in Louisiana and will be fully described later in this report.

Mounds on Bonnet Bayou, Assumption Parish.

About two miles up Bonnet bayou, on property of Mr. Gus Drews, of Morgan City, La., are three mounds about 200 yards in from the water.

The mound nearest the bayou, which, like the other two, has been plowed out of shape and greatly spread, is of tenacious clay and about 2 feet in height. As the mounds on this place were the reliance, in time of flood, of those owning cattle in that region, they were not accorded a thorough investigation; but several holes sunk into the one in question came upon a skeleton near the surface, so badly decayed that the exact form of burial was not determinable, though the skeleton seemed to have been closely flexed on the left side.

The remaining two mounds differed from the other in that they had been places of abode and contained a large proportion of midden material. They are known as "shell banks" in the neighborhood, though in reality they are far from being shell-heaps, containing as they do a small proportion of shells, mostly *Rangia cuneata*, with a few *Quadrula apiculata*, in such parts where shells are present at all.

The larger of the two "shell banks" was accorded an incomplete investigation, the holes indicating that the ridge, which had a maximum height of 4 feet where less plowing had been done than elsewhere, perhaps owing to the presence of trees, had increased in height in the main during a period of occupancy, as the material of which it was largely composed seemed to show. An addition, however, of clay had been made to the mound, presumably further to increase its height, probably after a time of unusually high water.

Scattered bones were found at several points in the mound, but only one burial was encountered. The superficial part of the mound above this burial consisted of a layer, 4 inches deep, of black loam with a mingling of shells. Presumably this layer had been much thicker at one time; in fact we were informed by the custodian of the property that all the mounds had been considerably higher in the past. Beneath the upper layer was a stratum of clay 14 inches deep, almost immediately under which lay the burial in black midden material which contained no shells, though it was noted that the corresponding layer in another part of the mound had a fair proportion of them. The burial, of the kind so

"The bit of pottery enclosed in your letter is the most westerly example yet found of the stamped ware which characterizes the south Appalachian region. The matrix is siliceous, and the pot has been built in the same way as the vessels from the states to the east of the Mississippi. The stamp used has been merely faced with a number of squarish teeth and has been applied as a paddle over the surface of the vessel."

This form of stamp has been fully described by Professor Holmes in his "Aboriginal Pottery of Eastern United States," pp. 78, 80, 20th Ann. Rep. Bur. Am. Ethn.

often found in this region, consisted of a layer of skeletal remains, including nine crania.

With these bones was a fractured humerus showing a fair union of the parts, all conditions considered. This specimen was sent as a gift to the Army Medical Museum, Washington, D. C., where a large collection of pathological specimens presented by us may be seen.

No artifact lay with the bones, although these people had pottery, as fragments marked with imprints of stamps were in the soil, and one part of a vessel was found having below the rim, five parallel, encircling, incised lines, each line, at intervals, having punctate markings.

On the surface of the mound was found part of a celt of igneous rock, having a flaring cutting edge and evidently having formed part of a graceful tool.

Mound on Little Pigeon Bayou, Iberia Parish.

On property belonging to Mr. Charles Forgy, of Berwick, La., on Little Pigeon bayou, is a mound in woods, about one-quarter mile SSW. from the landing. This mound, 5 feet in height and 75 feet across its circular base, was investigated by us to a limited extent only, as it was soon to be employed as a refuge in the approaching high water. It was, so nearly as we could determine, composed of raw clay and probably never had been a burial mound.

Mound[1] on Sorrel Bayou, Iberville Parish.

About a mile and a half along Sorrel bayou from its junction with Grand river is a mound in full view from the water, on property belonging to Messrs. A. Wilbert's Sons, of Plaquemine, La., whose large holdings of real estate in this region were most courteously placed by them at the disposal of the Academy for investigation.

The mound, most picturesquely situated, about 16 feet in height, is in the form of a truncated cone, with a diameter of 140 feet. It has been used extensively for burial purposes during the last seventy years and is covered with crosses and head-stones. Digging into it was deemed inadvisable.

In contact with and about surrounding the northern half of the mound (ENE. to WSW.) is a kind of platform with some irregularity of surface. The maximum height of this platform at the western end, where it is 100 feet broad (12 feet of which belongs to the slope), is 6 feet. From this end the platform slopes downward somewhat toward the eastern end, where it again ascends, reaching a height of 5.5 feet. At this end the platform is 145 feet across, 20 feet of which is slope.

Trial-holes sunk in this platform showed that it increased during aboriginal

[1] This mound is shown on the United States Government "Map of the Alluvial Valley of the Mississippi River, from the head of St. Francis Basin to the Gulf of Mexico." Published by the Mississippi River Commission. A most useful publication for those interested in this region.

occupancy, as it was composed largely of black soil containing ashes, charcoal, fragments of mussel-shells, remnants of fish-bones and of deer-bones, with occasional fragments of pottery. In the soil was found also a bone identified by Prof. F. A. Lucas as the penis-bone of an otter. Some of the holes were extended to the base of the platform, through this midden material without interval of any kind. On the other hand, in places, layers of clay, several inches in thickness, were present, locally, and perhaps had been placed in connection with burials, as these layers were sometimes found in the neighborhood of some of the skeletal remains; other burials, however, were without such strata.

The platform apparently was crowded with burials (nearly all our holes reaching them), and at all depths, some beginning one foot from the surface, while one in the high, western part of the platform was only 12 inches above undisturbed clay, which there was found 7.5 feet down.[1]

It was impossible to define the limits of the grave-pits, which seemingly had been dug at different stages in the growth of the platform, as the material of which the platform was made was nearly uniform in color, and the clay layers, when present, did not entirely cover the burials as a rule. These burials, which, with two exceptions, were great deposits of bones mingled and spread and of course out of anatomical order, sometimes connected on the same level, or, at times, layers of bones somewhat below others were dug into when soil was being thrown out to facilitate the removal of upper deposits.

Burial No. 1 was the skeleton of an adult, at full length on the back.

Burial No. 2, adult, lay closely flexed on the left side, the upper part of the skeleton being more than 3 feet from the surface. The skull and some of the other bones of this skeleton were saved.

The remaining burials, for reasons aforesaid, were not separately enumerated The bones belonging to them included two hundred and sixty-eight skulls, two being of adolescents and five of children. Sixteen crania that were in condition to preserve, including the skull belonging to the single burial referred to, were sent as a gift to the United States National Museum and are described by Dr. Aleš Hrdlička in a paper at the close of this report.

At least two of the skulls from this place, when unearthed, were filled with clay very light in shade and entirely differing from the soil in which they were found. This fact indicates a reburial, strong evidence of which we found also in the Mayes Mound at Lake Larto, which is described in this report.

We know that reburial was practised to some extent, at least, throughout this region. Of the Chitimacha,[2] who lived in various villages throughout this part of Louisiana, we are told:[3] "One year after the death of a head chief, or of

[1] Probably our measurement of the height of the platform was taken from made-ground about 1.5 foot above undisturbed clay.

[2] John R. Swanton, "Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico," p. 337, *et seq.*, Bureau of American Ethnology, Bulletin 43

[3] *Ibid.*, p. 350, quoting Gatschet.

any of the village war chiefs, of whom there were four or five, their bones were dug up by a certain class of ministrants called 'turkey-buzzard men' (*ōsh hä' tch'na*) the remaining flesh separated, the bones wrapped in a new and checkered mat and brought to that lodge. . . . After which the bones were placed in a mound. . . . The burial of the common people was effected in the same way, one year after death; but the inhumation of the bones took place at the village where they had died."

No artifact of any kind was found in association with the burials. In the midden débris were: four implements of bone, each having the articular part remaining at one end; several broken bone implements; three of those objects of clay to which reference has been made and of which full description will be given later; and a rude knife of chert.

The fragments of pottery from this place are of good, hard ware, sometimes fairly thin, and indicate vessels presenting a variety of shapes and decoration of average excellence. One fragment shows uniform decoration with red pigment, and a number of others bear imprints made apparently by the aid of a stamp.

Mound near the Schwing Place, Iberville Parish.

At the Schwing Place, on Grand river, said to belong to Messrs. Wilbert's Sons, of Plaquemine, La., are remains of a railroad extending inland. Following this road for about one mile and then entering woods on the south side of the track, a distance of about 200 feet, one reaches a mound between 4 and 5 feet in height and about 75 feet in diameter.

Eleven trial-holes showed the mound to be variously composed, some of the holes reaching clay of a light shade, comparatively well up in the mound, others going through black soil, evidently midden material, down to what seemed to be the base.

The more central trial-holes came upon six burials, as follows: two bunched burials, each with one skull; a burial at full length, too much decayed to determine if originally it had lain on the back or prone; the skeleton of a child; the skull and the upper half of the trunk of an adult skeleton, the rest missing through some cause that was not apparent; a skeleton at full length on the back.

The full-length skeleton described as badly decayed lay with six inches of earth above it. Three inches below the skull, or about 15 inches down, was a deposit of objects of earthenware, thirty-two in fairly good condition and a number of imperfect ones and fragments. The deposit was not heaped, but was spread at the same level. These objects are of the kind referred to before in this report, and belong to the type of artifacts found in great numbers at Poverty Point, on Bayou Maçon, La., examples of which are shown in Plate II, and which will be fully described in connection with the Poverty Point site. The objects from that place have various shapes, but those under description from the Schwing Place mound belong, such as are whole, to two classes, one having the

shape of two cones placed base to base, and the other, also a double cone but with four longitudinal furrows. Examples of these are shown in Fig. 2.

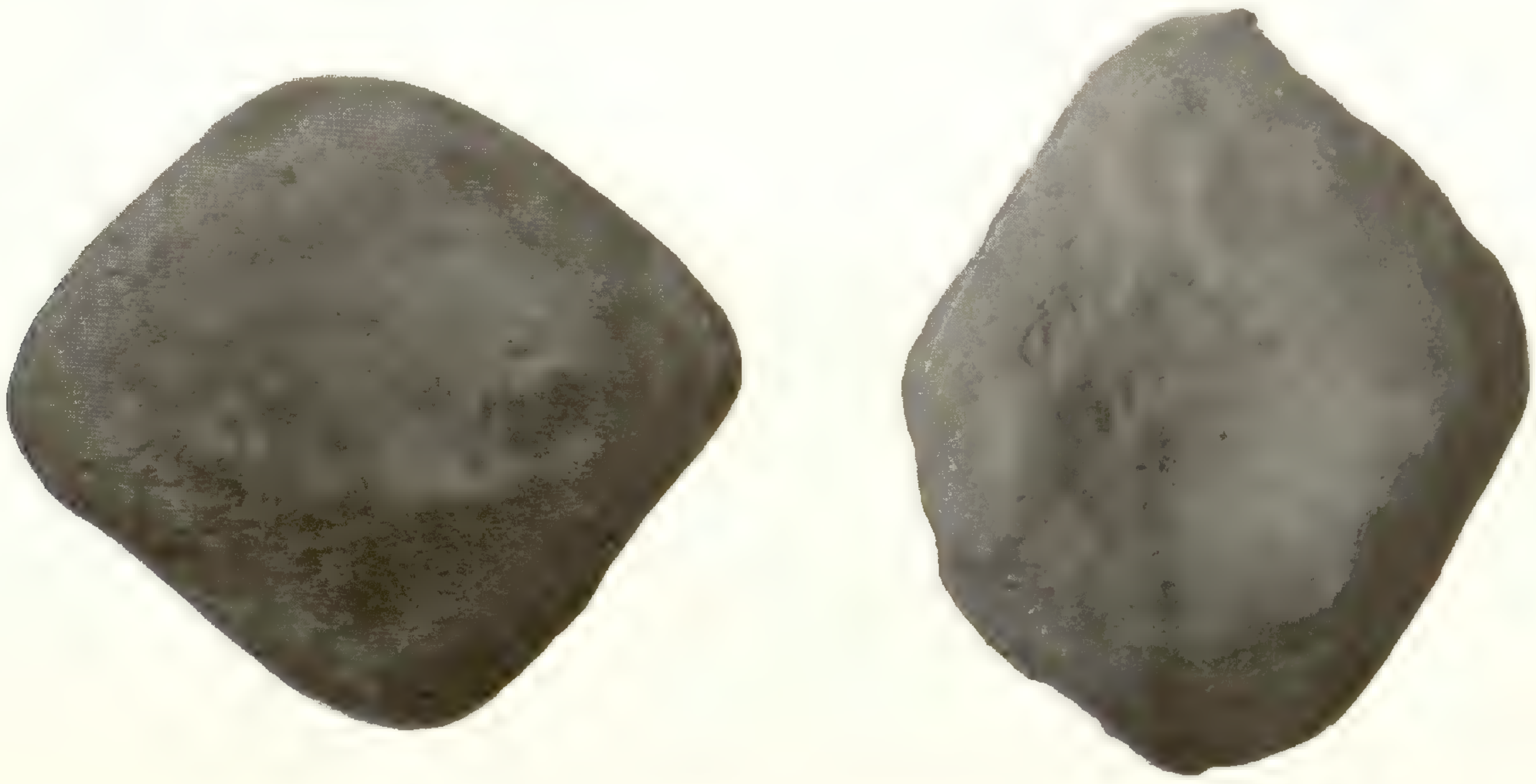


FIG. 2.—Objects of earthenware. Schwing Place. (Full size.)

All these objects from this place, even the fragments, were coated with what Doctor Keller has determined to be clay, sand, and fine particles of carbon—ash material. In other words, these objects had lain in a fireplace, though there was no sign of a former fire where they were found.

Throughout the mound, and evidently midden-débris, were various fragments of pottery, some of fairly good quality, several having simple designs composed of incised lines, and one showing traces of red paint.

Apart from bones was a flint arrowpoint or lancehead about 3 inches in length, one barb of which is missing.

MOUND OPPOSITE PIGEON BAYOU, IBERVILLE PARISH.

Entering woods opposite Pigeon Bayou, belonging to Messrs. A. Wilbert's Sons, of Plaquemine, La., and keeping a NNE. direction for about 200 yards from the water, one comes to a mound which was visited by our agents at a time when the Atchafalaya river was fairly low. This mound, at that time, was reported to be 100 feet in diameter and 4 feet in height. It was possible for us, later, owing to high water, to reach this mound only by boat, but as most of it was under water, no investigation could be attempted.

MOUNDS ON LAKE LA ROSE, ST. MARTIN PARISH.

On the bank of Lake La Rose, within sight of one another when not obscured by foliage, are three mounds on property of Mr. Robert Martin, of St. Martinville, La.

The mound nearest the water and in full view from it has been quadrangular, and probably square, but has been greatly washed and worn. We were told that on its summit-plateau, now 24 feet by 48 feet in extent, forty persons had

lived for four months during the great flood of 1912. The plateau, it was said, then was larger than at present, but had worn away under this prolonged and congested occupancy. In height the mound slightly exceeds 11 feet; its diameter of base is about 95 feet each way.

It was evident the mound had been occupied for a considerable period in aboriginal times, and that graves had been dug into it, probably from the surface, and filled with a black, superficial soil differing in color from the clay of which the mound had been made. Presumably, however, the dark surface soil had been mostly worn away from the mound, as it was present only in graves, of which five were encountered. Four of these graves held scattered fragments of bones, probably disturbances, all about one foot from the surface. One burial, 16 inches down, was of the bunched variety, with one skull.

In view of the reliance placed on this mound as a place of retreat by those living near it, and that the rising water was not far from its base at the time of our visit, we did not feel justified in undertaking more extensive digging into it.

In a SSW. direction from the quadrangular mound is another in the form of a truncated cone, 8 feet in height and about 90 feet in diameter. This mound had dark soil extending more than two feet down in places, but considerable digging failed to discover burials.

In the dark soil was found a graceful bead of granite, tubular in the main, but expanding slightly at the center; it measures somewhat more than one and one-half inch in length and one-half inch in maximum diameter.

This mound is promising in appearance, and under different conditions a large central excavation would have been sunk to its base.

The third mound, an insignificant affair, is composed of tough clay. A very brief investigation was accorded it.

Mounds on Bayou La Rose, St. Martin Parish.

About 200 yards from the bank of Bayou La Rose is a mound 7 feet in height and about 95 feet in diameter of base. This mound, in woodland belonging to Mr. J. S. Martin, of St. Martinville, La., was surrounded by water at the time of our visit, and no digging into it was attempted. Near it was a small mound in part covered by water, which also was left untouched.

Mound on the Wilbert Property, Iberville Parish.

About 100 yards in from the east bank of Atchafalaya river, in woodland belonging to Messrs. A. Wilbert's Sons, of Plaquemine, is a mound about circular in basal outline and 60 feet in diameter. The height is from 18 inches to 2 feet. The mound proved to be a mass of roots and tough clay and yielded no return.

Mounds on Bayou Grosse Tête, Iberville Parish.

On Grosse Tête bayou, on property of the L. O. Landry Co., of Grosse Tête, La., are two mounds which were visited by our agent, one reported to be

10 feet in height and about 70 feet in diameter; the other about half that size. Though these mounds were placed at our disposal for investigation, the high water prevailing at the time we reached their vicinity was such that digging into them was deemed inadvisable.

Mound on Alabama Bayou, Iberville Parish.

In open woods, probably a comparatively recent growth, as the place seemed to have been under cultivation, opposite the mouth of Johnson's bayou, about 200 feet in from the water, is a mound, the name of whose owner we did not learn. This mound, with a base irregularly circular, 60 feet in diameter, is about 4.5 feet in height. It has been used as a refuge for hogs, and the sides are considerably worn. The mound proved to be of tough clay with no sign of interments.

Seventy paces in a southerly direction from this mound is another about 2 feet in height and 50 feet in diameter. In the center of the mound is a water-oak, a tree of no great age, 18 feet in circumference 5 feet from the ground. The roots of this tree made investigation practically impossible.

Mounds near Cross Bayou Landing, Pointe Coupée Parish.

About two miles below Melville, but on the opposite, or eastern, side of the river, a mound was visited by our agent who reported it to be about 5 feet in height and 50 feet in diameter of base. As the owner of the mound seemed to consider that the privilege of digging into it should be richly paid for, the question of its investigation was dropped.

Mounds near Melville, St. Landry Parish.

About two miles in a southerly direction from Melville, if a straight line were followed, but somewhat more by the way it is necessary to take, is the property of Mr. E. B. Dubuisson, of Opelousas, La., on the southern bank of Burton lake, which is probably a small bayou across the mouth of which a levee has been built.

In a cultivated field on this property, but a short distance apart, are a ridge and a mound.

The ridge, which evidently has been plowed down to a great extent, is 160 feet in length. At the western and wider end it is 85 feet across. From this end, where its height is about 4 feet, it slopes gradually downward. No trace of interments was found in this ridge.

The mound, which has been quadrangular, is considerably worn and probably parts of the sides have been under cultivation. Its height is about 8.5 feet. Its basal diameters are 110 feet and 125 feet. There is dark soil on the summit-plateau, which is 45 feet by 50 feet, but hard, red clay is soon reached in digging. We found no sign of burial in this mound, but a thorough examination

was not accorded it, as the water was rising rapidly at the time of our visit and the mound was likely soon to be required as a refuge for stock.

There is no history of the discovery of aboriginal relics at this place. A few small bits of undecorated pottery were seen by us at the base of the mound, and a delicate, barbed arrowhead of flint was picked up on it.

Bayou Teche, to the westward of the Atchafalaya region, this season was visited by us without advance search, and inquiries were made as to the existence of mounds, almost to St. Martinville, the head of navigation, 85 miles from Morgan City, following the course of the stream.

The banks of this bayou were under cultivation or occupied by towns or mills without interruption so far as visited by us, and the region evidently has been thickly inhabited for too long a time to offer archæological returns of much interest.

Several mounds were reported to us as being in the back country and probably under water at the time (April, 1913). Another mound, visited by us, had been almost plowed away.

At Moro plantation, St. Mary Parish, belonging to Mr. Oscar Zenor of Calumet, La., are two mounds near together and in full view from the water.

The mound nearer the bayou, 13 feet in height and about 100 feet in diameter of base, had been dug into somewhat previous to our visit, and one side had been removed, perhaps by wash, leaving so steep a section that it was possible to fall from the summit to the base on that side.

Although this mound was connected with a shell ridge on the eastern side, formed almost entirely of a variety of clam-shell, *Rangia cuneata*, and midden deposit extending along the bank of the river, such excavations as were made by us in the mound showed only scattering shells, and no mass of shells was apparent at the section where the interior of the mound was laid bare.

Apparently the mound was made of tough clay. But one skeleton was found; this lay 16 inches below the surface, extended face downward. A previous excavation had cut away the skull and the right side of the thorax.

The second mound, 10.5 feet high and about 110 feet in basal diameter, had been under cultivation and great furrows remained on its surface, though it was overgrown with underbrush and grass at the time of our visit.

This mound, so far as excavated by us, was of hard clay without sign of burials.

Immediately across the bayou from Charenton is the home of Mr. F. C. Viguere. One mile across country from this gentleman's residence, in St. Mary parish, near the border of Grand lake, are five mounds composed largely of shell, and various shell ridges.

These mounds, with one exception, were covered with growing sugar-cane, so that our investigation was restricted to this one, which was 7 feet high and about 125 feet in diameter.

Wiley Place
Mayes Place
Little Larto Bayou
Big Larto Bayou
N
Black River
Red River
MAP OF LAKE LARTO
Scale in miles
0 1 2 3 4 5
1913

It had grown up under aboriginal occupancy and was composed largely of shells, *Rangia cuneata*, a clam very abundant in this region. No burials were found in it, though human bones are said to have been plowed up from some of the other mounds at this place.

In midden débris was a sherd of inferior ware, on which was red pigment.

At Loreauville, Iberia parish, are two mounds a short distance apart, both in sight from the water, each about 5 feet in height and 80 feet in diameter, approximately. Human bones in fragments were visible upon one, and both mounds had an inviting appearance, but multiplicity of owners and of heirs living at a distance made investigation impossible.

LAKE LARTO, LOUISIANA.

Lake Larto, in Catahoula Parish, La., has long been famous locally for the discovery of aboriginal relics.

The lake, somewhat resembling a horseshoe in shape, is about ten miles in length. It is comparatively narrow, but less so at the head of the lake, near which is an island of considerable size.

Lake Larto is connected by bayous with Catahoula lake, Little river, Black river, and Red river, Big Larto bayou, its main outlet, joining Red river about forty miles by water from Mississippi river. The lake has Little river to the north, Black river nearby, to the east, and Red river to the south. To the west is a region bounded by Red river, and directly east, beyond Black river, is the Mississippi. Such parts of all these rivers as are near or comparatively near Lake Larto have been investigated by us without results of especial interest.

Captain J. S. Raybon and a companion searched the lake in our behalf previous to our coming.

Mayes Mounds, Catahoula Parish.

About one mile along the western shore of Lake Larto from its union with Big Larto bayou is open woodland, forming part of a property belonging to Miss Josie S. Mayes, of Harrisonburg, La. One-quarter mile in from the landing, approximately, on this property, are two mounds, the one nearer the water being irregularly circular in outline with a basal diameter of 165 feet. The height of the central part of the mound is about 5 feet, though it was doubtless somewhat higher at one time, as indicated by the superficial position of some of the burials in it. Though a few trees are upon the mound at present, it has evidently been under cultivation in the past, and the dark superficial soil, which no doubt covered it to some depth at one time, has now disappeared in places.

The mound, with pens and a shed upon it, is a refuge for cattle and hogs in periods of high water, therefore an investigation impairing its usefulness was not to be thought of; nevertheless, we were able to put down very many trial-holes in all parts of it, greatly enlarging them in some instances, and after most

careful filling, to leave the mound in almost its normal condition. The Academy feels greatly indebted to Miss Mayes for full permission to make an investigation on her property.

Fortunately the composition of this interesting mound is of a nature to facilitate exact conclusions. It was composed of homogeneous, light-brown clay, and a mixture of this clay and black soil from the surface filled the pits, all of which evidently had been dug from the surface at a time when the deposit of black midden-soil thereon was greater than it was at the time of our investigation. Hence delimitation of the graves was a matter of comparative ease.

The aboriginal burials (there were some comparatively recent ones which we did not permanently disturb) seemed to have been placed in the eastern portion of the central part of the mound.

The pits contained accumulations of skeletal remains, but were not filled with them; nor were the bones in one mass, they having been placed here and there in different parts of the grave (some always on the base of it) as if, after a deposit, partial filling had taken place and then other deposits had been made and covered. These deposits, the bones of which were all very badly decayed, were made up sometimes of the bones of one individual apparently, sometimes of a number.

As the burials in this mound present features of considerable interest, they will be described in detail.

Burial No. 1. This pit, roughly circular, 8 feet by 9 feet and 4.5 feet in depth, contained deposits of bones beginning 18 inches below the surface, among which were sixteen crania. At times, long-bones slanting upward rested along the sides of the pit, as was the case in other burials in this mound.

Together with skeletal remains lying on the base of the pit were: powdered hematite (red pigment); two masses of kaolin (white pigment) each about the size of a fist; a lump of yellow ochre, also a pigment. With these was a flat pebble of flint.

Near these paints was a bicave of fine-grained sandstone, 2.25 inches in diameter; and on another part of the base of the pit, with bones, lay a fine effigy-pipe of earthenware, 4.3 inches in length and 3.5 inches in maximum height. This interesting pipe (for large effigy-pipes of earthenware are of great rarity, effigy-pipes of considerable size usually being of stone) represents a frog, and is shown in three positions in Plate I and in section in Fig. 3. It has had a uniform coating of red pigment, now worn away in places. The pipe has seen considerable use, as the interior of the bowl, well blackened by fire, clearly shows.

Apart from the burials, in the soil in this grave, were the base of an earthenware vessel and part of a base with some of the side of another vessel. In one base is a perforation of considerable size; and it is evident, from part of it remaining, there has also been one in another base. These perforations had been made at the time when the vessel was in process of modeling, previous to the firing of the clay. We have here a very interesting feature, namely, the

MAYES MOUND, EFFIGY-PIPE OF EARTHENWARE. (FULL SIZE.)

ceremonial "killing" of vessels, in a region where it was seldom practised. This "killing," as the reader probably is aware, was done to free the "soul" of the vessel that it might accompany the spirit of the owner on his journey. This custom was practised chiefly by aborigines of Florida and southern Arizona, sometimes by knocking a hole in the bottom of a vessel, sometimes by cutting a hole in it, after the completion of the vessel. Ceremonial vessels in Florida also were often made for mortuary rites, with a hole moulded in the base during the process of manufacture, similar to some of those present in this mound, and some vessels even had additional openings made in the body.[1]

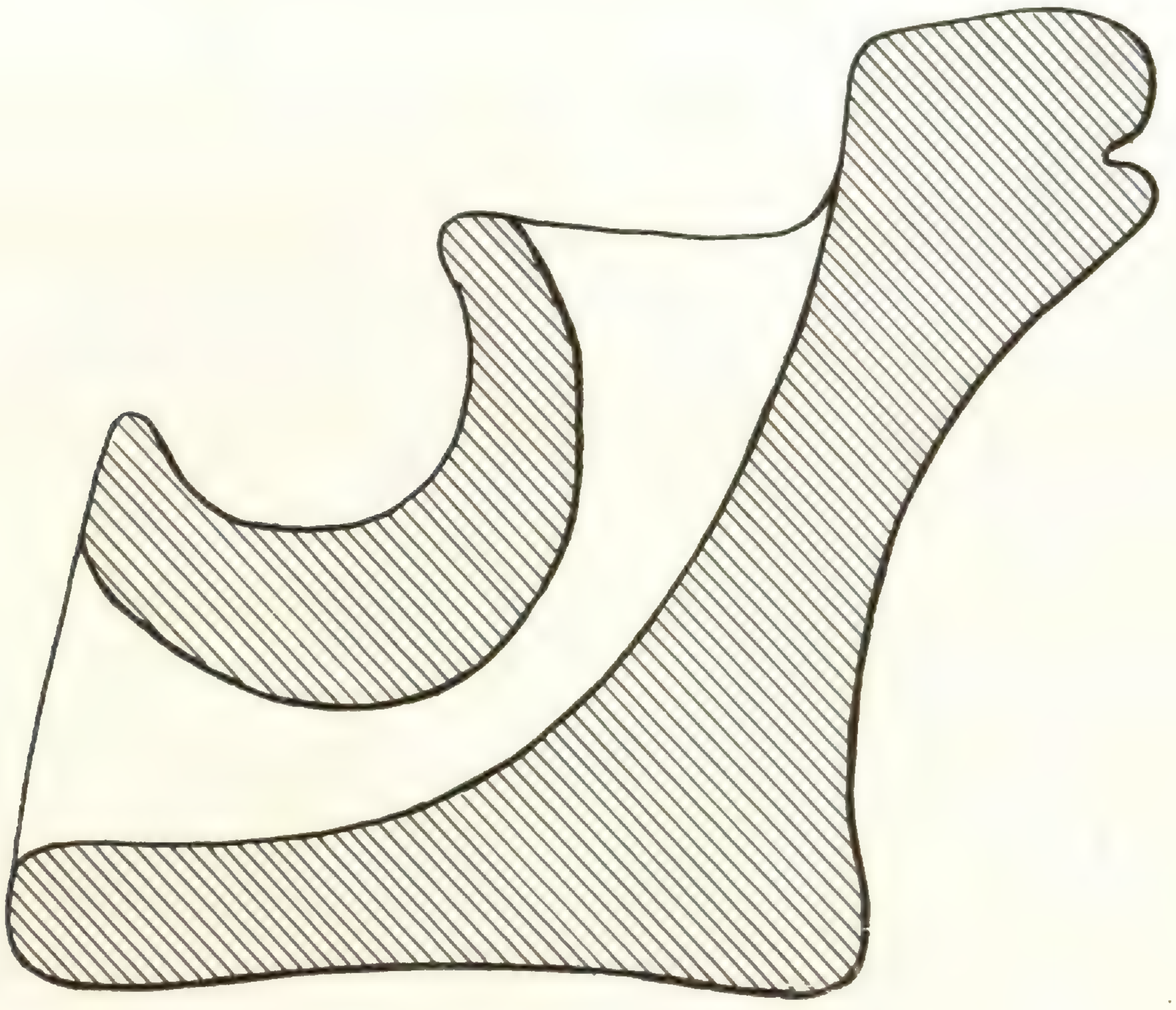


FIG. 3.—Pipe. Vertical section. (Full size.)

Burial No. 2. This pit, an irregular ellipse, 10.5 feet by 7.25 feet and only 2 feet in depth, contained skeletal deposits including thirty-three skulls.

Near a skull was a bicave ear-plug of hard earthenware, 1.3 inch in diameter, flaring on what was no doubt the side presented in front when the ornament was in use. Both faces bear a black polish now somewhat impaired. The circumference is comparatively rough. Presumably the remaining ear-plug had fallen from the skull before burial, or possibly had been lost in the process of reburial, which probably had been practised in this mound, to which custom we shall have occasion to refer later in connection with this place.

Lying above a group of six skulls was a bowl of earthenware, unbroken and

[1] The fullest details as to the "killing" of vessels are given in our reports on the archæology of Florida and of nearby regions.

without basal perforation, 7.75 inches in diameter, bearing no incised decoration, but having an encircling depression below the rim. The ware, which is inferior, is tempered with gravel or with small bits of pottery.

In the neighborhood of skeletal remains was a small celt, having the edge entirely chipped away, and part of another.

Burial No. 3. This burial was a skeleton at full length, 16 inches from the surface, so badly decayed that it was traceable by small fragments only.

Burial No. 4. This pit was oblong, with rounded corners, and measured 8 feet by 5 feet 9 inches by 4 feet 8 inches deep. Interments were encountered 7 inches from the surface and continued down at intervals in the way already described. The skeletal remains included sixty-six skulls. With the bones, in places, were numerous fragments of bones showing marks of fire, but not calcined.

Unless objects of a perishable nature were placed with the burials in this pit, the aborigines presumably considered their duty to the dead fulfilled when they had deposited with them: part of a very rude knife of flint; a little powdered hematite at one place on the base; probably a rattle, of which but a group of small pebbles remained; a pot of earthenware, having by way of decoration a series of encircling, parallel, incised lines below the rim. This vessel was so badly crushed that determination as to the presence of a basal perforation was impossible.

Burial No. 5. An elliptical pit, only 14 inches deep at the time of our investigation, and 7.5 feet by 5 feet in extent. Human bones, including twelve skulls, appeared immediately under the surface and continued to the base. It may be well to explain that the skulls in this mound were so badly decayed that they were invariably crushed and that some were represented by fragments only. A fireplace lay beneath part of this pit, but the bones showed no effect of heat and the presence of the fireplace perhaps was adventitious.

No artifacts accompanied the remains in this grave.

Burial No. 6. An oblong pit 6 feet 10 inches by 4 feet by 2.5 feet deep, with a small offset at one side. Human remains, including twenty-three skulls, extended down from 3 inches below the surface. With the remains were an undecorated pipe of hard earthenware, shown in Fig. 4, and in section in Fig. 5, and part of a somewhat similar one. There was present also a small vessel, in fragments (as were all the vessels from this mound with the exception of one already described), having in the base a mortuary perforation made before the firing of the clay. Also with bones was a lump of pigment tending toward purple in shade, especially when damp, similar to that found by us in the mound on the Haley Place,[1] on Red river, southwestern Arkansas. It has been determined that pigment of this kind is ordinary red hematite that has been subjected to heat. Presumably the aborigines were acquainted with the method of manu-

[1] "Some Aboriginal Sites on Red River," pp. 531 and 548. Journ. Acad. Nat. Sci. of Phila., Vol. XIV.

facture of this pigment and that its occurrence is not owing to accidental contact with fire.

Burials Nos. 7, 10, 11, respectively 7 inches, 6 inches, 1 foot from the surface, were interments of adults extended on the back. No artifacts were in association.

Burial No. 8. This grave-pit, which included in its contents twenty-one skulls, was oblong, 8 feet by 4 feet by 3 feet deep. Bones were first encountered 6 inches from the surface. With the remains was a small bowl bearing rude,

FIG. 4.—Pipe of earthenware. Mayes mound. (Full size.)

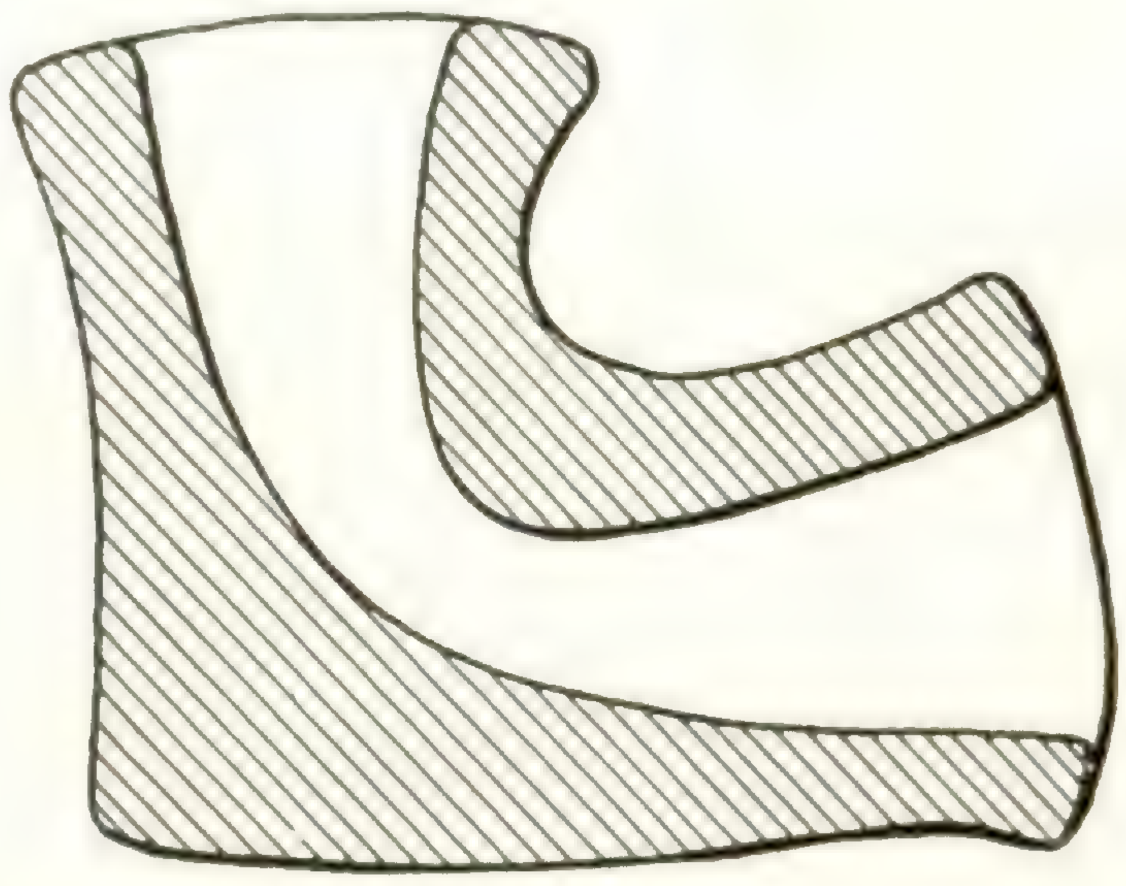


FIG. 5.—Pipe. Vertical section. (Full size.)

incised, scroll decoration. The base of this bowl was not present with the other parts recovered by us, and presumably had been knocked out ceremonially. Another small bowl was found having rude, lined decoration and so badly broken that determination as to a basal hole was not possible.

A part of a large earthenware pipe from this pit, consisting of most of that portion made for the reception of the stem, bears on each of two opposite sides, two concentric circles surrounding a dot. Around the orifice for the stem is a deeply incised circle, and the beginning of other decoration, also incised, is on the top of the fragment.

There were also found separately in the pit, a small bicave of coarse sandstone, and an arrowhead, or knife, of flint, having but one shoulder, a peculiarity already on record[1] as occurring on some flint points from this (Catahoula) parish.

Burial No. 9. Oblong, with rounded corners, 7.5 feet in length, the two ends being respectively 3 feet and 3 feet 8 inches across. The grave was 1 foot 8 inches in depth, and bones, including seven skulls, lay within four inches of the surface. In association with the interments was a lump of yellow ochre in a deposit consisting of a rude lancehead of quartzite, slightly more than 5 inches in length; two lanceheads of flint, each about 3 inches long; and a lancepoint or arrowhead, also of flint, having a length of 2.5 inches.

[1] Gerard Fowke, "Stone Art." Thirteenth An. Rep. Bur. Am. Ethn., p. 156, fig. 218.

Burial No. 12. This pit was 8 feet long by 4 feet wide and had at the southern end an offset 30 inches wide and 2 feet in depth. The depth of the grave was 4 feet, and human remains, including forty-nine crania, were present from 10 inches below the surface, extending at intervals to the base.

Fig. 6.—Pipe of sandstone. Mayes mound. (Full size.)

Near the surface was a small pot with rude line-decoration and having a hole broken through the base. Two pebbles lay near a skull, and in the vicinity of another was a sandstone lancehead, 4 inches in length, having marginal notches on both sides of the blade. This lancehead can hardly have been intended for any practical purpose.

Burial No. 13. This pit, in the form of an irregular ellipse, was 9 feet by 5 feet 2 inches, and 2.5 feet deep. Skeletal remains, among which were twenty-five crania, were found, some within 3 inches of the surface.

This grave yielded: a quartz pebble slightly biconvex, which had the margin, originally roughly circular, additionally rounded; an earthenware vessel with a hole in the bottom, made previous to the firing; part of another vessel which had been similarly treated.

Fig. 7.—Pipe of sandstone. Mayes mound. (Full size.)

Almost on the base, with bones on all sides, were two pipes immediately together. One of these is of earthenware, biconical, with scant line-decoration. The other, of sandstone, is 3 inches in height and has a maximum diameter of 3.2 inches. The decoration, which is incised, consists mainly of series of crescentic lines. This pipe is shown in Figs. 6, 7 and in section in Fig. 8.

Burials Nos. 14 and 18. Pit No. 14, 8 feet by 2 feet 8 inches, and 2 feet 4 inches deep, was contiguous to Pit No. 18, which was 6 feet 3 inches by 6 feet 10 inches, and 3 feet deep. When these graves were first discovered they were supposed to be a single grave and burials from both of them were noted as belonging to one pit. Later, when it was found that there were two graves in actual contact without division for a distance of at least 4 feet, it was then too late to determine which burials scored had belonged to each grave, and consequently all from both graves are noted together.

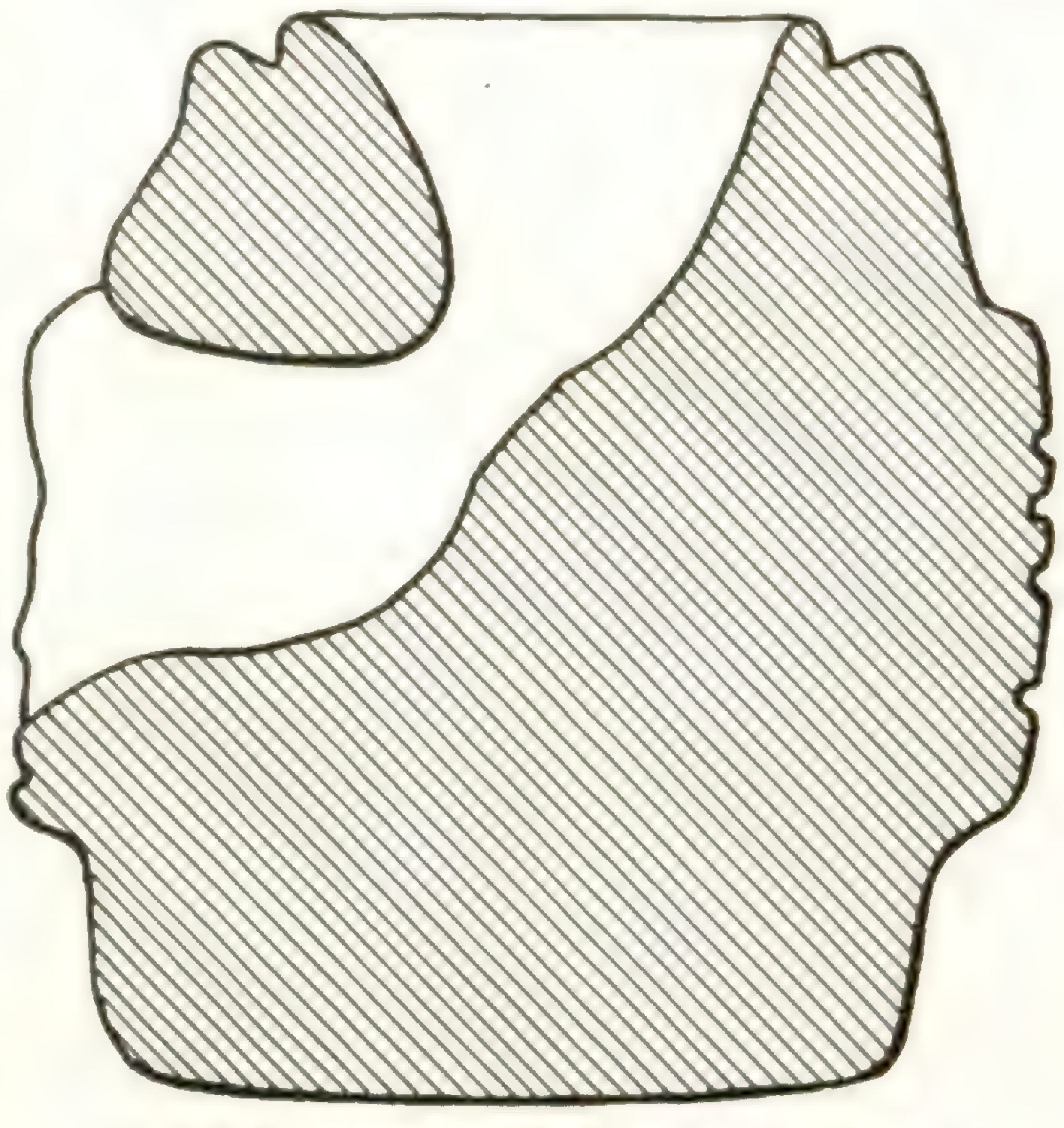


FIG. 8.—Pipe. Vertical section. (Full size.)

Human bones were first encountered 10 inches from the surface. With them were forty-one crania.

Mortuary deposits in this grave were as follows: an earthenware vessel having a hole in the base, made after the firing of the clay; another vessel with the bottom ceremonially broken out; a small undecorated bowl having a hole broken through the base; a lump of yellow ochre.

Burial No. 15. A pit 10 feet 5 inches long and 5 feet 9 inches across each of its rounded ends, and 3 feet 2 inches in depth. Skeletal remains were within one foot from the surface and included eighteen skulls.

Artifacts with the remains were: a flint pebble about the size of a fist; another considerably smaller; a pottery vessel through the base of which had been a ceremonial hole, but whether made before or after the firing of the clay we were unable to decide, owing to the condition of the ware.

Burial No. 16. This pit, circular, so nearly as we could determine, was 34 inches in diameter and 13 inches deep. It contained fragments of badly-decayed bones on its base, but if any cranium had been present its parts were not in a condition to identify.

Burial No. 17. This grave, oblong with rounded ends, 8 feet 5 inches by 4 feet 7 inches, and 1 foot 9 inches deep, contained human remains with eight skulls, extending to within six inches of the surface. There were no associated artifacts.

Burial No. 18 has been described in connection with Burial No. 14.

Burial No. 19, a long and narrow grave, 8 feet in length, 2 feet 9 inches across at the middle and 2 feet wide at each end. The depth was 2 feet 3 inches. This grave, which held four skulls with other skeletal remains, the bones being within 8 inches of the surface in places, had been somewhat longer than the measurement given, but had been cut across at one end by Burial No. 18.

Burial No. 20. This grave-pit, which was 8 feet long, 6 feet across at the middle and about 5 feet 8 inches at each end, had a depth of 2 feet 3 inches, the sides sloping inward somewhat toward the bottom, as was the case with all the graves in this mound. Skeletal remains, among which were twelve crania, were within 8 inches of the surface.

The only artifact, if such it may be called, coming from this large grave, was a flat pebble with some evidence of wear on parts of the margin.

Fig. 9.—Vessel of earthenware. Mayes mound. (Full size.)

Burial No. 21. A grave 4 feet 2 inches in depth, elliptical in outline, having a length of 7 feet 9 inches and a maximum width of 4 feet 3 inches. The bones, which included six skulls, were found comparatively deep, none being nearer than 21 inches from the surface. With the remains was no artifact whatever, but well up toward the mouth of the grave, as if to do duty for all below it, a vessel had been placed. This vessel, undecorated but of graceful shape, has a ceremonial hole knocked through the bottom.

Burial No. 22. This grave was perplexing. It was irregularly oblong, 7 feet long with ends 3 feet 9 inches and 3 feet 4 inches, respectively. Its depth was 3 feet 4 inches. Only two skulls were discovered in the pit, accompanied by a limited amount of minute fragments of other bones, some within 8 inches of the surface. It seemed unlikely that the aborigines would make a grave of such large size for so limited an interment. The grave was filled with roots of a large

Fig. 10.—Vessel of earthenware. Mayes mound. (Height 5.1 inches.)

tree, growing nearby, and it is barely possible that many of the bones were absorbed by them.

From this pit came an undecorated, biconical pipe of earthenware, from which a small part of the bowl had been broken before its inhumation.

This pit apparently had cut through a narrow and shallow grave in which were a skull and other bones that may have been a burial at length.

A few inches distant from the larger grave, but clearly separated by the yellow clay, was a small, shallow pit filled with dark soil, in which, however, no bones were found.

Burial No. 23. This grave, oblong with rounded corners, 8 feet by 3.5 feet by 1 foot 10 inches deep, contained bones, including thirty skulls, which reached to within 8 inches of the surface in places.

Part of a pot having a basal perforation made before the firing of the vessel was the only artifact accompanying the numerous deposits of bones.

No bones of children were discovered in this mound, and if any had been placed in the graves explored by us—and it seems likely that such was the case—all trace of them had disappeared.

An interesting point in connection with this mound is that none of the four single burials of skeletons from it had any artifact in association.

As a general rule one expects to discover, and generally does discover, more artifacts placed with single skeletons than with burials of the bunched variety. The reason for this presumably is that entire skeletons probably are of individuals dead a shorter time at the period of interment than were those to whom the disconnected bones belonged, whose ligaments no longer held them together, and consequently the affection of those related to the individual burials had been allowed less time to abate.

Fig. 11.—Vessel of earthenware. Mayes mound. (Height 4.9 inches.)

In this mound, as in the one at Sorrel bayou, in the Atchafalaya region, already described in this report, reburial of bones evidently had taken place, as a number of skulls were found filled with clay differing entirely in shade from that present in the mound. It is true that Lake Larto is somewhat north of the country of the Chitimachas, by whom it is recorded reburial was practised; nevertheless it is clear the custom was not confined to that region.

The pottery from this place, though not of more than medium quality, shows evidence of considerable care in finish in some instances, and, as a rule, is graceful in form. One piece bears a high polish, and in this connection it is interesting to note that the pebbles found in this mound had the appearance of having served as smoothing stones. The decoration of the ware is incised and punctate as a rule, a favorite design being a series of incised, encircling, parallel lines below the rim.

The most interesting feature connected with the pottery from this mound is the presence in the vessels, almost without exception, of the ceremonial, basal perforation. The more interesting vessels from this place are shown in Figs. 9, 10, 11, 12, 13.

Fig. 12.—Vessel of earthenware. Mayes mound. (Height 2.7 inches.)

Fig. 13.—Vessel of earthenware. Mayes mound. (Height 8 inches.)

In a trial-hole which did not encounter bones, was a barbed arrowhead of flint, about one inch in length.

About 130 paces WSW. from the mound just described is the other mound, which is irregularly circular in outline, about 4 feet in height and 180 feet in diameter. This mound was carefully searched without any indication of its former use as a place of burial.

Wiley Place, Catahoula Parish.

The place belonging to Mr. Mitchell Wiley, who resides upon it, is about at the middle of the southern shore of Lake Larto. It is to this place the lake owes its reputation as a center for the discovery of aboriginal relics, and not to the Mayes mounds, which presumably had not been investigated before our coming.

Immediately on the shore of the lake, on Mr. Wiley's place, are three low mounds of irregular outline, apparently greatly worn as each has a building

upon it and is constantly subjected to the going and coming of persons and of stock. There is also, beyond these mounds but in sight from them, another one 3 or 4 feet high and possibly 50 feet in diameter. Into this mound, Mr. Wiley informed us, he had dug centrally a considerable excavation without finding anything. The mound, upon inspection, proved to be of raw clay.

According to Mr. Wiley, but one of the three low, flat mounds contains burials, so far as his experience goes. While conversing with us Mr. Wiley removed from this mound, with a knife, a human femur, which lay partly exposed on the surface. Some years ago, Mr. Wiley explained, a member of the faculty of a college in New Orleans had dug extensively into this mound, finding pottery and two undecorated pipes of earthenware, evidently of the biconical kind, according to Mr. Wiley's description.

Mr. Wiley informed us that aboriginal relics were constantly being unearthed at the place during his cultivation of the fields, but none presented any feature of especial interest, according to the descriptions furnished by him.

In Mr. Wiley's possession were: a number of small, barbed arrowpoints of flint; an earthenware vessel representing a frog, from which parts were missing; a charm-stone, elongated ovoid in shape, made from a pebble, bearing a groove to facilitate suspension; a discoidal bead wrought from part of a shell, the thickness suggesting marine origin; three or four small stone hatchets.

The effigy-vessel, through the base of which a ceremonial hole had been broken, was rudely made and inferior to many vessels of the same class from other localities.

As the lake had covered Mr. Wiley's property in the great flood of the preceding year, and as the water, which was again rising was not far from his home at the time of our visit, Mr. Wiley was unwilling to have digging attempted in the mounds on which his buildings were, and, under the circumstances, we cannot see how his decision could have been otherwise.

TENSAS RIVER, LOUISIANA.

Tensas river has its source in Lake Providence, in the northeastern part of that portion of Louisiana which lies west of Mississippi river, and keeps a southerly course in the main until, at the town of Jonesville, La., it joins Ouachita and Little rivers, the three forming Black river, which continues to its junction with Red river.

Tensas river is considered navigable to a settlement called Westwood, 81 miles by water from the union of the three rivers, but the stream was searched by our agents from the town of Quebec down, a much greater distance.

The Tensas was investigated by us up to Indian bayou, about 22 miles by water above Westwood, by dint of felling projecting trees which barred the passage of the narrow stream, and by lopping off interfering boughs. The river could have been explored considerably farther in the high water prevailing

MAP OF PARTS OF TENSAS RIVER AND BAYOU MAÇON

Scale in miles

0 5 10 20

1913

at the time, had it not been reported that a mass of entangled logs, trees, and driftwood, known as a jam, formed somewhat above Indian bayou, effectually blocked the stream. Probably with the force at our command and expenditure of time, the jam might have been contended with successfully, but the result of our archæological work on Tensas river had not been such as to encourage us to proceed, especially as the report of our agent as to the river above was adverse.

Inspection of the map accompanying this report might lead one to judge that parts of that portion of the Tensas covered by us had been slighted by our expedition, since so few places are shown where archæological work was done, but in point of fact much of that portion of the Tensas territory investigated by us is uninhabited near the river,—mainly timberland, sometimes with heavy undergrowth or canebrake,—and though mounds may be present in woods or swamps bordering such parts of the stream, these mounds were not visible or in a position to be found by unguided search, nor were inhabitants to be seen from whom inquiries could be made.

The archæology of Tensas river is in the main uninteresting. Burials (which were made in mounds and not in cemeteries) had so few artifacts with them that that feature constitutes the most interesting part of the archæology of the stream.

Sites Investigated.

On Indian Village Place, Concordia Parish.
Near Wildwood Landing, Catahoula Parish.
On the Flynn Place, Tensas Parish.
On Alphenia Plantation, Tensas Parish.
On the Hedgeland Place, Catahoula Parish.
On the Mound Bayou Place, Tensas Parish.
On the Lee Place, Tensas Parish.
At Fool river, Madison Parish.
Near Indian Bayou, Madison Parish.

Mound on Indian Village Place, Concordia Parish.

About one-quarter mile in from the landing, on property of Mr. H. C. Luckett, of Natchez, Miss., is a mound about 5 feet high and approximately 100 feet in diameter of base. This mound at one time had been quadrangular, with a summit-plateau. There was no history of any discovery of artifacts or bones on the place, and as the mound had been devoted to burial purposes in recent times, no work was done there by us.

Mound near Wildwood Landing, Catahoula Parish.

About one-half mile westwardly from Wildwood Landing, in a cultivated field forming part of the plantation of Mr. Robert J. Eltringham, who resides upon it, is a mound fairly symmetrical and evidently about square originally. The sides face the cardinal points. Its diameter of base is 100 feet approximately,

of which about 60 feet lie beneath the summit-plateau. Its height is 7 feet.

This mound, which evidently had belonged to the domiciliary class, was filled with recent burials, the headstones extending to the very margin of the summit-plateau. No investigation was attempted.

Careful search in surrounding territory came upon no indication of an aboriginal cemetery, nor was there any history of discoveries made in the course of cultivation.

Mound on the Flynn Place, Tensas Parish.

The Flynn Place is the property of Mr. H. D. Hassler, of Wildwood, La., a short distance farther down the river. About one-half mile in from the water, in a cultivated field on the upper part of the Flynn Place, is a mound slightly less than 6 feet in height, which at one time, no doubt, had been quadrangular with an extensive summit-plateau—presumably a mound of the domiciliary class. The outer part of the mound, however, has been plowed to such an extent that its basal outline is very irregular. Measurements at the time of our visit gave diameters of base of 70 feet and 95 feet.

This mound had been extensively used for burial purposes in recent times. A few holes sunk where no sign of former interments was apparent, showed the mound to be of raw clay.

Two neighboring rises in the field surrounding the mound, on which were a few fragments of flint and of pottery, were investigated by us, but undisturbed soil was soon reached without the discovery of artifact or bone.

Mounds on Alphenia Plantation, Tensas Parish.

Alphenia Plantation, bordering Tensas river, the owner of which is Mr. F. E. Bowman, who resides upon it, has in sight from the water three interesting mounds, all of which, with extensive summit-plateaus, probably have been about square at one time, though wash of rain has rounded the corners and in places has cut into the sides of the mounds to a considerable extent.

For greater convenience in description we shall assign letters to these mounds, calling that nearest the river, *A*; its nearest neighbor, *B*; and the third mound, *C*. These mounds are thus lettered on the accompanying plan (Fig. 14).

Before proceeding to give the dimensions of these high places it may be well to remind those who are not familiar with mounds through actual work in the field that all measurements of mounds are lacking in exactness, for who can determine, in taking a diameter, precisely where field ends and mound begins, or can say, in a measurement of height, that he has selected the exact level from which to take it? When mounds have suffered considerably through wash of rain or of flood, or by trampling of cattle, the measure of uncertainty is, of course, increased since these agencies tend to augment the irregularity of the sides and to create depressions in the surrounding ground.

Mound *A*. Height, 19.5 feet; diameter of base, 170 feet.

Mound *B*. Height, 14.5 feet; diameter of base, 130 feet.

Mound *C*. Height, 18 feet; diameter of base approximately the same as that of Mound *A*.

All three mounds had about the same diameters of summit-plateau, namely, 70 feet.

At the side of each mound was a depression, filled with water at the time of our visit, whence came the material for its building. These ponds were, respectively, west of Mound *A*, north of Mound *B*, south of Mound *C*.

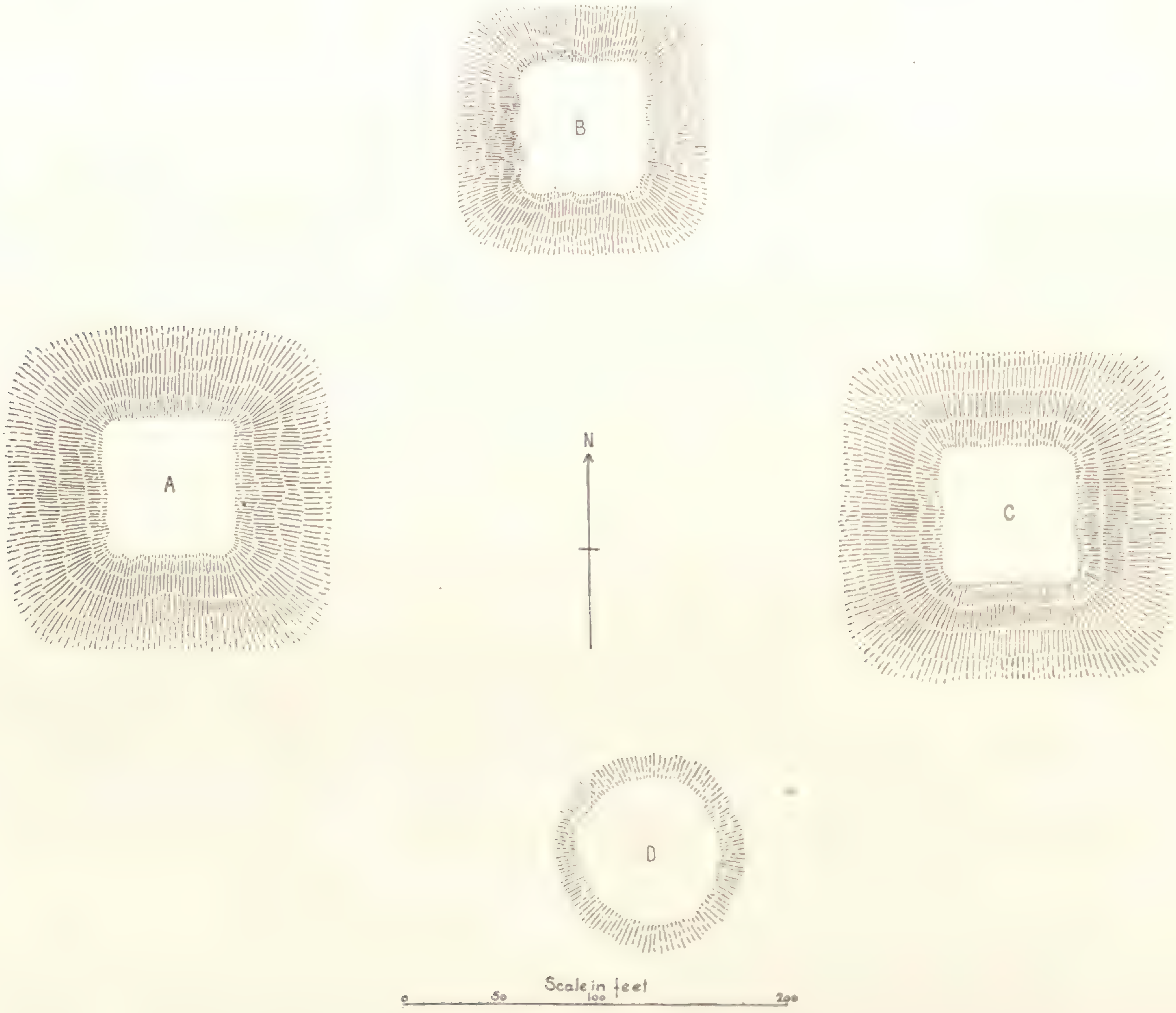


FIG. 14.—Plan of mounds. Alphenia Plantation.

The sides of the mounds all face the cardinal points, and an equally interesting feature is that the three mounds have been arranged to form a triangle, the apex of which is directed toward the north, while the base is east and west. Furthermore, to the southward of the base of this triangle is the remainder of a mound, marked *D* on the plan. This mound at the present time is less than 2

feet in height, but has been under cultivation for many years. The owner of the plantation, Mr. Bowman, informed us that it was cleared by his father in 1844 and that the mound in question at that time was some feet higher than it is at present. While this mound can never have rivaled the others in size, it no doubt was an important landmark and probably was the nucleus of what was intended to be a much larger mound.

If this mound be taken in conjunction with the other three, we find a diamond-shaped figure with mounds at the four angles, which angles are directed toward the cardinal points of the compass, or nearly so. In the case of the southern mound it was, of course, impossible to determine the center, owing to the partial demolition referred to.

Still further, if lines be drawn connecting the centers of opposite mounds (the center of Mound *D* being to a certain extent assumed), a cross will be formed whose arms point approximately toward the cardinal points—a cross of the four directions.

Mounds *A* and *C* in comparatively recent years had been devoted to purposes of burial, Mound *A* being the cemetery of the Bowman family. Investigation of these mounds, of course, was out of the question.

Mound *B*, used as a place of refuge for stock in flood-time, had a summit-plateau whose soil presented a dark appearance. Ten trial-holes, a number of which were afterward greatly enlarged, were put down with a feeling of considerable confidence, which later was justified by the discovery of eight burials.

Some of these burials presented an interesting feature. While five of them were comparatively superficial, ranging between 10 inches and 2 feet in depth, and had been put down from the surface, three other burials were from 4.5 to 5 feet in depth. These burials were not in pits extending from the present surface, as was shown by the presence of unbroken strata above them, but lay in soil darkened by the presence of organic matter, with which were mingled midden débris and remnants of fireplaces. This deposit of soil evidently marked an earlier stage in the growth of the mound when it had served as a place of abode prior to its increase in height.[1] Soil of a much lighter color and undisturbed, as we have said, lay between the upper and the lower dark layers, and this, no doubt, had been brought when the increase of the mound was decided on. We shall describe each burial in detail.

Burial No. 1, a bunched burial one foot in depth, measured from its upper surface, included eleven skulls, badly decayed and broken, as were all the human remains from this mound. One of the skulls was that of a child.

The bunched burials in this mound were not symmetrically piled as such burials sometimes are, but, though limited in width, extended considerable distances.

Burial No. 2, bunched bones with two skulls, was 20 inches down.

[1] A notable instance of this was found by us in one of the great mounds of the group at Moundville, Ala.

Burial No. 3. At a depth of 22 inches, had been two skeletons of adults, lying at full length on the back, the skulls together, the bodies radiating somewhat. A narrow pit from the surface, probably made in recent times, perhaps a post-hole, had removed the skulls and the upper part of each thorax.

Burial No. 4, a bunch with one skull; depth, 2 feet.

Burial No. 5, a bunched burial 4.5 feet from the surface, having fifteen skulls.

Burials Nos. 6 and 7. Each a bunched burial with one skull, at a depth of 10 inches and 4.5 feet, respectively.

Burial No. 8. A bunched burial having three skulls, 5 feet down.

If mortuary deposits had been made with these burials, such deposits were of a perishable nature, since absolutely nothing lay with the skeletal remains that can be considered to have been intentionally put in. With one burial was an unworked astragalus of a deer, and with another, a small bit of stone grooved by use as a hone. In the soil near a burial was a graceful arrowhead of flint, 2 inches in length and slightly more than .5 inch in maximum diameter, the point unfortunately missing.

Among the few fragments of pottery found in the digging were one with a decoration of faint, trailed lines, and a part of a handle, also with line-decoration, which evidently had extended at a right angle from the rim of a vessel.

On the fields in which the mounds were was considerable midden débris, especially on the surface of Mound *D* and on a slight rise nearby. Some arrowheads of flint, small and barbed, were found, and quantities of fragments of pottery could be seen, including some bearing on one side a uniform coating of red pigment. All these were in small fragments, as one would expect them to be, having been plowed up and under through a long period of years.

On the surface of Mound *D* was picked up a graceful celt of quartzite, 2.5 inches in length.

Considerable digging in the field surrounding the mounds showed remains of former occupancy but unearthed no sign of skeletons.

Mounds on the Hedgeland Place, Catahoula Parish.

The Hedgeland Place, belonging to Mr. H. W. Foeman, has two mounds upon it, both in sight from the landing. That nearest the water, about 13 feet in height, has been quadrangular, but is so greatly washed and worn that measurements as to its present diameter of base are practically valueless. One measurement gave 125 feet, but others, if taken, would show marked variation. An exposed section of this mound showed it to be of clay, with no evidence of use for burial purposes.

In a cultivated field is a mound 10 feet in height, which has suffered to an even greater extent by the ravages of time. Two measurements gave diameters of 165 feet; but this was a coincidence, as the basal outline was very irregular. What remained of the summit-plateau had been used as a cemetery in recent times.

Mound on the Mound Bayou Place, Tensas Parish.

On the Mound Bayou Place, belonging to Mr. A. Blanche, who resides upon it, is a mound about one-quarter mile back from the landing, slightly less than 12 feet in height. This mound, which borders the road, is quadrangular, the basal diameters being 130 and 110 feet; those of the summit-plateau, 60 and 40 feet in the same directions. The sides of this mound do not face the cardinal points, nor are its corners directed toward them. As the summit-plateau of this mound had been used extensively for burials in recent years, no digging into it was attempted.

Across the road from the mound, in a cultivated field, was a small rise into which we dug unsuccessfully.

Mounds on the Lee Place, Tensas Parish.

In a cultivated field in sight from Lee Landing, on property belonging to Mrs. C. L. Lee, of Gilbert, La., is a circular mound 4 feet in height and 65 feet in diameter of base. Nearer the landing, beside the road, is a somewhat smaller mound on which stands a building intended for cattle. We were informed that both these mounds had been made in recent times as places of refuge in high water.

Mound at Fool River, Madison Parish.

An angle formed by the union of Fool river with the Tensas is much higher ground than is any neighboring territory, and for this reason, and because bits of pottery lie on the surface there, the whole of this high place has been called an Indian mound by lumbermen and others who occasionally use it as a camping place and whose numerous flasks, drained of their spirituous contents, scattered over the ground are about the only sign of the civilization of the white man to be seen for miles around.

That this high ground is a natural formation is clearly shown by a wide section exposed by the wash of Tensas river. On the alluvial clay, however, is a thin, superficial stratum caused by aboriginal occupancy, in which is the usual midden débris—hence the sherds found on the surface.

About fifty yards back from the Tensas river, on this elevated ground, is an irregularly circular mound, about 100 feet in diameter and somewhat more than 4 feet in height.

Each of seven trial-holes sunk into this mound almost at once encountered human remains, which were found in such quantities in the three trial-holes first investigated that these were greatly enlarged and carefully examined, the digging out of the remaining burials being dispensed with.

The upper part of the mound was composed of a layer about 16 inches in depth, dark in shade, perhaps from having been gathered from the nearby swamp, but containing no midden débris whatever. Below this was a stratum of soil black from admixture of organic matter, 3 feet 4 inches deep (of course

the depth of these layers varied somewhat locally), in which were quantities of broken mussel-shells, some fragments of pottery and of bones of lower animals, and a few fireplaces. It was clear that this lower layer, which rested upon undisturbed clay, had been a dwelling-site to which an addition had been made.

Burials were present in both layers, but no signs of pits were apparent, and if any had been made from the present surface of the mound into the lower layer, they would have been filled with a mixture containing shells and other débris.

A number of burials lay immediately on top of the lower layer, so that it seems likely that those living on the original, or under, layer buried in it for a period, and that at some time the contents of the bone-house had been spread over the surface of the original mound and the upper layer of clay had been placed upon them. By far the greater number of burials, however, seemed to be in the lower part of the mound, which probably had been built up throughout a long period of occupancy.

Judging from the three excavations made by us, the lower part of the mound had been buried into to such an extent that in places it had become a complete entanglement of bones. The burials found, none of which was deeper than about 3 feet, included sixty-six skulls, thirteen of which had belonged to children or infants.

The form of burial, in the main, had been at full length on the back (one skeleton lay extended, face down), but to such an extent had grave cut through grave in this mound that only parts of many extended burials remained, the rest of the skeletons being mixed in the contents of the disturbing graves.

Also in this mound it had been the custom, when interring a skeleton the bones of which probably were held together by ligaments at the time, to gather up and put with this burial a quantity of loose bones belonging probably to some who had died at an earlier period. For example, one extended burial in the mound had beside it and above it a mingling of bones belonging to skeletons of two adults and of one child.

With all the skeletal remains removed by us from this mound was not an artifact of any kind. Scattered in the midden débris were a few small fragments of pottery, several bearing decoration of incised, parallel lines and two having a uniform coating of red pigment.

For some reason, stone of any kind was, so far as our investigation went, of extreme rarity in the mound; only in one instance (a fractured pebble) was any encountered.

A mound on the bank of the Tensas, about in line with the preceding one, 3 feet high and 60 feet in diameter, proved to be of clay and contained no burials so far as could be determined.

Mounds near Indian Bayou, Madison Parish.

Part of the extensive property on Tensas river, belonging to Mr. A. E. Hinds, who lives near Indian bayou, is bounded on the north by that stream

and on the east by Tensas river. Near Mr. Hinds' residence are four mounds and a small rise by the roadside, all near together and in sight from the river. The mounds have each a building upon it, and three of them, originally small, have been so worn and washed that they are of inconsiderable size.

The largest mound, which has been square, with the sides facing the cardinal points, has rounded corners at present, but is otherwise well preserved. The height is 12 feet 8 inches; the diameter of base is about 140 feet. The summit-plateau is 50 feet in diameter.

Owing to the presence of buildings, these mounds were not dug into by us.

Following the Tensas river northward about half a mile to Indian bayou, one comes upon a group of eight mounds in woods, which form an irregular ellipse with two mounds facing each other and three mounds on each side. This ellipse is about 88 yards by 54 yards, interior measurement, and the mounds which compose it are visible from the banks of the stream, some of the mounds in fact bordering the water. These mounds, which are very irregular in outline, are of moderate size, the northernmost being 7 feet 6 inches in height and 120 feet by 135 feet in diameters of base.

These mounds for convenience were assigned letters of the alphabet, beginning with the largest mound, *A*, and continuing in order through the western side of the ellipse and then along the eastern side bordering the water. As the mounds on Mr. Hinds' place are the only refuge in the case of high water, we did not consider it fair to dig into them to any great extent, though Mr. Hinds, with great courtesy, placed no restrictions upon us. All, however, were dug into to a greater or less extent, some giving evidence of being made of raw clay, presumably without burials.

Mound *C*, about 2 feet in height, however, had scattered fragments of mussel-shells mingled with the soil that composed it. The skeleton of an adult, extended on the back, was found in this mound at a depth of 28 inches.

Mound *E*, on the bank of the stream, has been undermined slightly by the water and has, at the opposite side, a road passing over it. Two diameters of its irregular basal outline were 77 and 90 feet. Its height is 5 feet.

Two recent burials have been made in this mound, so that our digging in it was somewhat restricted. Aboriginal burials in numbers were reached almost at once by trial-holes, which showed the mound to be composed approximately of a superficial layer of dark soil mingled with organic matter and quantities of fragments of mussel-shells. Below this layer was a stratum of light-brown clay, 2 feet 8 inches in depth, which showed no admixture indicating former aboriginal occupancy. Below the clay was a stratum 1 foot 8 inches in depth containing organic matter and broken mussel-shells, but to a less extent than did the superficial layer. Below this was undisturbed clay.

This mound, then, had been a dwelling-site; had been increased in size and then had been occupied for a further period as a place of abode. The burials had all been made from the top layer into the stratum of clay below it.

and could be easily traced by means of the black soil introduced into the clay from above.

The burials from this place were of the kind we have just described in connection with the mound at the mouth of Fool river, which is some miles below Indian bayou, having been burials at length, with loose bones around them, and irregular piles of bones of considerable extent. In all, forty-four skulls, two of which had belonged to children, were encountered, in poor condition.

With one burial were: a small undecorated bowl; a pot of moderate size, having by way of decoration a few vertical and diagonal incised lines. The bowl rested on a disk of ferruginous sandstone, 2.5 inches in diameter, pitted on each side.

With another burial was a pebble 1.5 inch in diameter, on which rude facets had been worked.

No other artifacts were found with burials or apart from bones.

Our search for burials in other mounds of this group was unsuccessful.

BAYOU MAÇON, LOUISIANA.[1]

Bayou Maçon (the map showing sites on Bayou Maçon is included with that of Tensas river, which precedes) rises in southeastern Arkansas, not far from Mississippi river, and flows in a southerly direction, passing into the state of Louisiana, where it continues in the same direction until its junction with Tensas river.

The stream flows through comparatively low, alluvial land, considerably higher on the western side so far as our investigation extended, on which side of the stream the most important sites are to be found.

Bayou Maçon is reported navigable from its mouth to the town of Floyd, La., a distance of 112 miles, following the course of the stream. It was explored in advance by our agents, Captain Platt and a companion, from Floyd to its union with Tensas river, and was investigated by us over the same extent.

Though no attention has been given by the United States government to the removal of snags or of overhanging trees from the bayou farther up than the town of Floyd, yet with the high water in the bayou at the time of our visit, no doubt with care and with effort our journey could have been considerably lengthened, had it not been that the stream a short distance above Floyd was hopelessly blocked, so far as our limited force was concerned, by a long-time accumulation of driftwood.

On the whole, our investigation of Bayou Maçon was disappointing. The stream is not far to the eastward of Bayou Bartholomew and Ouachita river, along which were found by us the most beautiful aboriginal pottery known from the Mississippi valley, as to which exact data are to be had. Such earthenware as was found by us along the bayou was not of a kind to uphold the high reputation of the best aboriginal ware from the lower Mississippi region.

[1] The part of Bayou Maçon investigated by us is in Louisiana.

The most interesting part of Bayou Maçon, speaking from an archæological point of view, is, so far as our investigation extended, the great aboriginal site at Poverty Point below the town of Floyd, the height of whose principal mound, 70 feet, in this part of Louisiana, is a revelation[1] to archæologists.

Sites Investigated.

Hopeka Plantation, Catahoula Parish.
On Dean Lake, Franklin Parish.
Near Cut-off Landing, Catahoula Parish.
The Hickingbottom Place, Franklin Parish.
The Brannin Place, Franklin Parish.
Near Turkey Point Landing, Franklin Parish.
The Canebrake Mounds, Madison Parish.
The Mott Place, Franklin Parish.
Near Hope Landing, Madison Parish.
The Montgomery Place, Madison Parish.
The Stevens Place, Madison Parish.
The Insley Place, Franklin Parish.
The Mound Place, Madison Parish.
The Lake Place, Madison Parish.
The Crowroot Place, Madison Parish.
The Richardson Place, East Carroll Parish.
Near Lower Jackson Landing, West Carroll Parish.
The Jackson Place, West Carroll Parish.
Poverty Point, West Carroll Parish.
Motley Place, West Carroll Parish.

Hopeka Plantation, Catahoula Parish.

Hopeka Plantation, near the union of Bayou Maçon with Tensas river, is the property of Messrs. H. & C. Newman, of New Orleans.

On the lower part of Hopeka Plantation is a field in which are several low rises whose surfaces are thickly strewn with bits of pottery and fragments of flint. Among these were a few slender arrowheads of flint. Also on the surface was found one of those objects of earthenware belonging to the class shown in Plate II. This one, of the double cone variety (Fig. 15), is especially interesting from the fact that a groove has been made around one part of it.

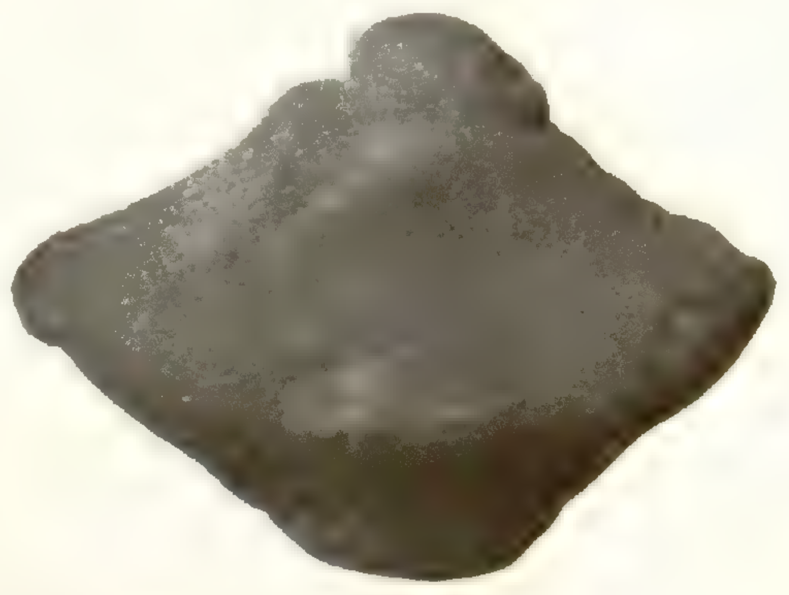


Fig. 15.—Object of earthenware. Hopeka Plantation. (Full size.)

[1] This site is referred to in Thomas' "Catalogue of Prehistoric Works," p. 104, in which no height is mentioned. There is a reference, however, to Prof. Samuel H. Lockett, Smithsonian Report, 1872, pp. 429, 430, where the site is briefly described, but the height of the great mound is not given.

Two of the rises were dug into, one of which had on the surface crowns of human teeth, but no indications of burials were found in either rise and it was evident that their former contents had been plowed away.

On the upper part of the plantation, in a cultivated field, near the water, is considerable dark soil with fragments of pottery, bits of flint, and arrowheads of the same material, broken and whole, on the surface. Trial-holes, however, failed to unearth any signs of interments.

Still farther up on the plantation, in sight from the water, is an irregular eminence with a wide trench, or barrow-pit, surrounding it. Although we were confident that this mound was modern, both on account of its shape and the presence of the barrow-pit, we did a small amount of digging which came upon raw clay. We were informed also, by persons living on and near the plantation, that the mound was believed to have been made comparatively recently to afford refuge for cattle in periods of high water.

Mound on Dean Lake, Franklin Parish.

On Dean lake, which is probably only a former course of Bayou Maçon, is a mound which may be reached by going about two miles in a northerly direction from Kimball Landing on Bayou Maçon.

The mound, the name of whose owner we were unable to learn, is about 100 yards from the eastern bank of Dean lake, in woods which one should enter about one-third up the lake from its southern end. The mound, 3.5 feet in height, is roughly circular, with a diameter of about 80 feet. It has been greatly trampled by cattle.

Seven trial-holes showed the mound to have a thin surface layer of dark soil and to be otherwise of yellow clay, except where dark earth from the surface filled pits. A base-line was present at a depth of about 4 feet.

Seven burials were reached by the trial-holes, which were much enlarged before the interments were removed.

Burial No. 1, a bunch extending down from the surface, included twenty-four skulls. This grave contained dark, superficial soil continuing down from the surface.

Burial No. 2 was of the bunched variety with one cranium. This burial was in yellow clay, and apparently had been made during the formation of the mound, as none of the dark soil of the surface was around it.

Burial No. 3, a bunch having thirteen skulls, 6 inches down. With this burial were two bicave stones of quartzite, respectively 2.3 inches and 2.2 inches in diameter, and a small drill of flint.

Burial No. 4, a bunched burial with four skulls, lay 15 inches down, in undisturbed, yellow clay. In association was a small lump of sandstone.

Burial No. 5, just below the surface, was a bunch having nine crania.

Burial No. 6, a bunched burial with a single skull, lay 18 inches down, in undisturbed, yellow clay.

Burial No. 7. This burial, a bunch with a single skull, was in the yellow clay, 22 inches from the surface.

Mounds near Cut-off Landing, Catahoula Parish.

By the side of a disused highroad, about 250 yards in a westerly direction from Cut-off Landing, on property belonging to Mr. H. A. Lewis, of Wisner, La., is a small remant of a mound, the remainder of which has fallen into the Cut-off, a bayou entering Bayou Maçon nearby.

Four holes sunk into this remnant (about all it would accommodate) each came upon skeletal remains, five burials in all being encountered. Of these, three were bunched burials, the bones all badly decayed, not arranged in piles but forming long and comparatively narrow deposits. One of these burials had sixteen skulls; one had nine skulls, three of which had belonged to children; and one had two skulls, one of which was that of a child. There were also two full-length burials of adults, extended on the back. All these burials were without mortuary deposit of any kind.

About one-quarter mile westwardly from Cut-off Landing, in a fallow field also belonging to Mr. Lewis, is a mound 11 feet in height, which has been so subjected to wash of rain (the earth having perhaps been loosened by trampling of cattle) that the sides are furrowed to such an extent that the mound has no regularity of outline. Measurements taken in two directions gave respectively as diameters of base 127 feet and 118 feet, but other measurements, we are convinced, would show a more marked divergence.

Seven trial-holes put down in the upper parts of the mound went through mixed soil to a depth of slightly more than 3 feet where they reached a layer of dark material 9 inches thick. Below this layer was hard, yellow clay containing no admixture.

Evidently this mound had been constructed to a certain height and then had served as a place of domicile for a considerable time, as evidenced by the dark layer. Later the mound had been increased in height by about 3 feet, not by the addition of clay dug from one place, but gathered here and there superficially. No sign of interment was encountered.

About one-half mile above Cut-off Landing, on the bank of the bayou, is the home of Mr. E. L. Lewis. A short distance from the house, by the side of a road which has cut a part from it, is an irregular rise about 2 feet in height and so worn and washed that it is almost impossible to distinguish the mound from the surrounding area. Considerable digging into this rise showed it to be composed of raw clay. No evidence of artificial origin was encountered.

Mound on the Hickingbottom Place, Franklin Parish.

In woods belonging to Mr. Louis Hickingbottom, residing nearby, is a mound, 1 foot 9 inches in height, in sight from the stream. The outline is irregular. Two diameters were 75 feet and 95 feet. This mound apparently had been built for residential purposes, as no sign of interments was discovered.

Mound on the Brannin Place, Franklin Parish.

In a cultivated field forming part of the Brannin Place, of which Messrs. E. H. Ratcliff and W. J. Feltus, of Natchez, Miss., are proprietors, is a very symmetrical mound, 15 feet in height, in full view from the water. Its basal diameters are, respectively, N. and S., 143 feet; E. and W., 122 feet. The diameters of the summit-plateau in the same directions are 80 feet and 66 feet. The sides of the mound face the cardinal points. The mound, so far as our trial-holes could determine, is of raw clay and contains no trace of burials. There are almost no signs of former aboriginal occupancy in the surrounding fields.

Mounds near Turkey Point Landing, Franklin Parish.

In sight from Turkey Point Landing, in a cultivated field belonging to Mr. A. M. Scott, who lives farther inland, is a mound with circular base, somewhat more than 3 feet in height when measured from the outside, but showing a total depth of about 4 feet when the measurement was taken by means of a trial-hole from the surface to a dark stratum presumably the original base.

The mound, which has been plowed over for a considerable time, and across part of which a private road passes, is composed wholly of dark soil. Its diameter was about 95 feet. In the southwestern part of this mound were numerous burials. Of eleven trial-holes put down, seven in this part of the mound and near it came upon human remains, and in removing these, other burials were found, making the total number thirty-six, all very badly decayed.

Of these thirty-six burials, which seem to have been interred in graves from the surface and none of which lay at a depth greater than 26 inches, seventeen were extended at full length on the back; sixteen were bunched burials; and three were remains disturbed by the plow. None of the bunched burials had more than three skulls, though several of the larger burials of this class, which had been somewhat disturbed by cultivation on the mound, may have had more than that number originally.

Various artifacts, mostly vessels of earthenware, lay with some of the burials of both classes.

With a bunched burial was an undecorated, biconical pipe of earthenware, quadrangular in cross-section, a very ordinary type.

With another bunched burial were three ear-plugs of claystone, not directly with the skull but near other bones. These ear-plugs, having cylindrical bodies with heads, include a pair, undecorated, each 2.1 inches in length. The other, 2.2 inches long, has two incised, concentric circles on the head and an incised line surrounding the shank near the end.

A small, rough arrowhead or knife, of flint, also lay near bones.

Thirty-seven earthenware vessels, or large parts of them, (evidently some of the vessels had been struck in plowing), lay with the burials, usually with the skulls, even in the case of bunched burials, several vessels in some instances with a single burial. Numerous interments, however, were without artifact of any kind.

FIG. 16.—Vessel of earthenware. Near Turkey Point Landing. (Height 3 inches.)

FIG. 17.—Vessel of earthenware. Near Turkey Point Landing. (Height 4.5 inches.)

The earthenware at this place, tempered as a rule with coarse sand or fine gravel, is without polish, save in two or three instances where an attempt has been made to confer it, and is soft, presumably through insufficient firing. The forms in nearly every instance embrace the bowl and the pot and vessels between the two. The bottle appears but once—small with a wide mouth. A pentagonal base separated from the rest of the vessel was present.

Fig. 18.—Vessel of earthenware. Near Turkey Point Landing. (Diam. 4.3 inches.)

As might be expected in the lower Mississippi region, the vessels are symmetrical, the ware is fairly thin, and a large proportion of them bear decoration, though the artistic aspiration that prompted the adornment of the ware was decidedly lacking in the skill or care necessary to its realization, much of the decoration, most of which is incised, being faint and with irregular line-work. Parallel lines, and curved lines including the scroll, predominate. No attempt at coloring is exhibited.

Several of the better vessels from this mound are shown in Figs. 16, 17, 18, 19, not because they present any special feature of interest, but to illustrate the earthenware of the place. One pot, fully equal to any of them, is omitted from the illustrations as in shape and in decoration (a scroll design on the body and parallel lines on the neck) it is almost exactly similar to one found by us at Seven Pines Landing, Morehouse Parish, on Bayou Bartholomew, La.[1] This vessel from the Turkey Point mound has been sent as a gift to the United States National Museum.

Presumably a large number of burials remained in the mound when our investigation came to an end, as additional digging was not desirable in view of the rising river.

Two small rises of the ground, respectively on properties of Messrs. T. S. Knight and N. H. Hill, not far north of the mound on the Scott Place, were dug into by us without success.

[1] "Antiquities of the Ouachita Valley," Fig. 172. Journ. Acad. Nat. Sci. of Phila., Vol. XIV.

FIG. 19.—Vessel of earthenware. Near Turkey Point Landing. (Height 3.8 inches.)

THE CANEBRAKE MOUNDS, MADISON PARISH.

In canebrake and woods are three mounds which we shall call *A*, *B* and *C*, respectively.

Mound *A* is the first reached by one ascending the river, and as is also the case with Mound *B*, is less than fifty yards from the water and visible from it when foliage does not intervene, though one seeking these mounds had best obtain a guide.

The mounds, beside each of which was a depression containing water at the time of our visit, are situated in respect to each other as follows:

From the center of *A* to the center of *B* (so nearly as the centers of mounds shaped so irregularly as these were could be determined) was 297 feet 49° 30′ E. of N.; from the center of *A* to the center of *C* was 215 feet 1° 30′ S. of E.; from the center of *B* to the center of *C*, 207 feet 3° W. of S.

The mounds, which are a favorite resort of cattle and which, no doubt, had been somewhat trampled down by them and washed by rain, had approximately the following dimensions:

Mound *A*, height, 4.5 feet; diameters, 75 feet and 100 feet.

Mound *B*, height, 3.5 feet; diameter, 95 feet.

Mound *C*, height, 4.5 feet; diameter, about 85 feet.

Mound *A* had a base-line about 8 inches thick, no doubt marking the original surface. Beneath this line was a yellow-gray mixture of sand and clay, showing no disturbance. Above the base-line was yellow clay about 26 inches in thick-

ness in the central part of the mound. Then above, came slightly more than 2 feet of dark soil, mainly clay discolored by admixture of organic matter. Doubtless the mound had been made of yellow clay and then dwelt upon while the upper layer of 2 feet, in which were fragments of mussel-shells and other débris, was forming.

Fig. 20.—Vessel of earthenware. Canebrake mounds. (Diam. 5.5 inches.)

Seven large trial-holes came upon human remains in one instance only. In the center of the mound, 38 inches down, were the legs and feet of a skeleton, extended and in anatomical order. These bones were well preserved, without break and in marked contrast to all the other bones found elsewhere at this place, which were so decayed that they were often represented by friable fragments only.

The bones in Mound *A* did not seem to lie in a grave, nor, so far as we could determine, had another grave cut off the part of the skeleton that was missing. Much digging was done in all directions around the bones, showing the basal

layer beneath to be undisturbed. Some distance from the other bones was part of a left radius in equally good condition. Presumably there had been some disturbance.

In other parts of the mound were an arrowhead of flint with shoulders and a stem, and that part of an earthenware platform, or "monitor," pipe, in which the hole is present, having a small part of the bowl.

Presumably Mound *A* was domiciliary in the main.

Mound *B* was variously composed. Seemingly it had been built upon a dwelling-site of very dark soil containing some mussel-shells. This dark, basal part was reached at different depths. Above this was the later mound, in places made of dark soil, in other parts of a clay lighter in shade.

Burials in this mound cut through no layer, but lay in and under homogeneous material so that it was impossible to distinguish pits.

Fourteen trial-holes, some of which were much enlarged after the discovery of burials, resulted in the finding of seventeen interments, the deepest lying 32 inches from the surface, as follows: extended on the back, two; bunched burials, fifteen.

Of the bunched burials four were without skulls; one had a single skull; seven were with two crania each; one included five skulls; one, ten skulls; one, eleven skulls.

The only object with the dead, other than pottery vessels, was a biconical pipe of earthenware, quadrangular in cross section, of such inferior material that parts adhered to surrounding clay when the pipe was removed.

A disintegrating pipe of limestone, of the same form as the one just described, was found in clay that had been thrown out in digging and presumably had been with an interment.

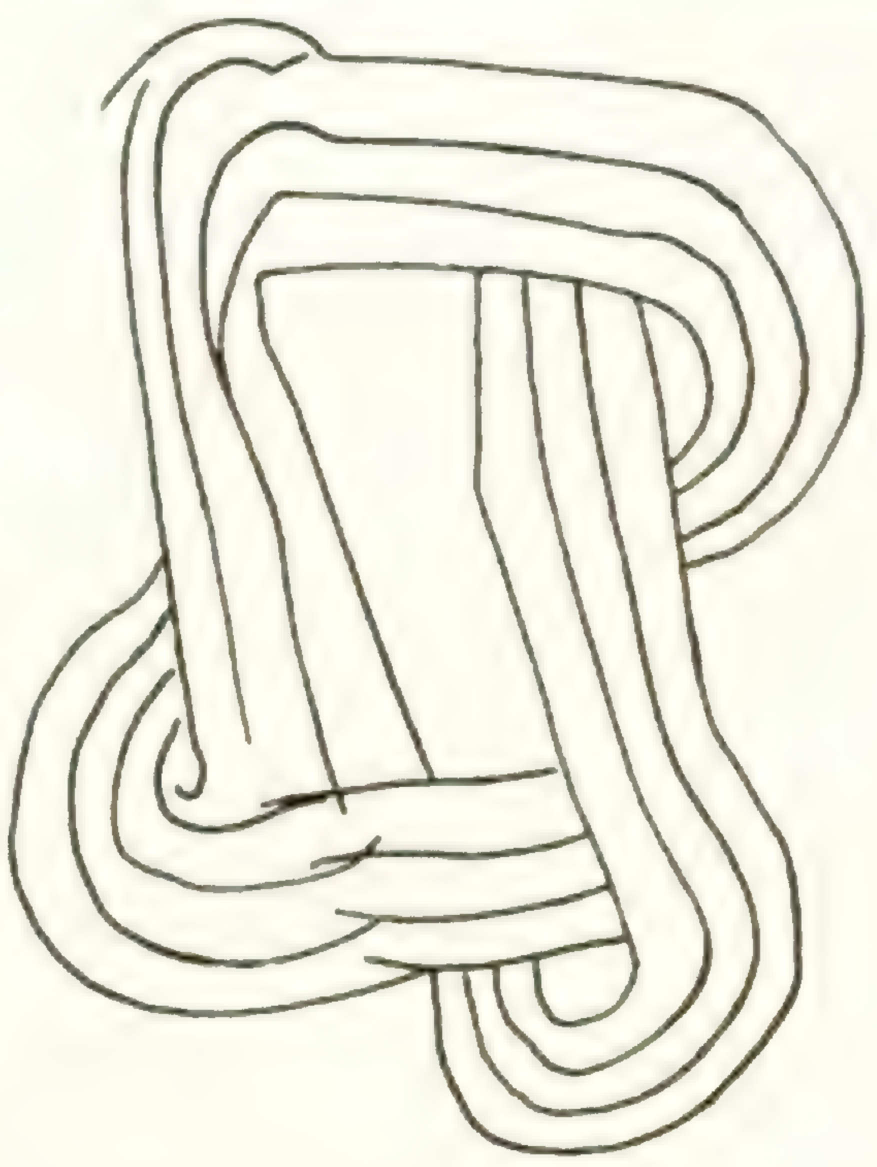


FIG. 21.—Decoration on base. (Full size.)

Thirty-four vessels, nearly all of coarse ware, of which only two were unbroken, lay with the burials, usually near the skulls. All but five bear decoration of some kind, though, as a rule, it is unambitious and of inferior execution. One symmetrical vessel of excellent ware, globular, with flat base and short neck (Fig. 20), bears on the body an incised decoration consisting of four scrolls radiating from circles, with triangles filling in the design. While the execution of this design is not equal to the highest standard of the lower Mississippi region, it is nevertheless well done, and the vessel as a whole is far above average work. Precisely the same decoration, though the shape of the vessel is different, is on one found by us in a mound at Glass,[1] Miss., in which some exquisite examples of

[1] "Some Aboriginal Sites on Mississippi River," Fig. 8. Journ. Acad. Nat. Sci. of Phila., Vol. XIV.

the potter's art were found. The vessel from the Canebrake mound has additionally, however, an incised design on the base, shown in Fig. 21.

A bottle[1] from this mound, which has seen much better days and at one time may have presented a rather striking appearance, still bears traces, on upright bands, of cream, black, and red, alternately.

Polychrome decoration on pottery is seldom found south of Arkansas river.

Fig. 22.—Vessel of earthenware. Canebrake mounds. (Height 9.1 inches.)

Certain other vessels from this mound are shown in Figs. 22, 23, 24.

Mound *C* was of black soil above a base-line about 6 inches in thickness, in which were mussel-shells and other débris. Below the base-line was an undisturbed mixture of sand and clay. Above the black part of the mound was a superficial layer of mixed, yellow clay. Both the upper and lower parts of the mound varied somewhat in depth, and it was evident that the lower part had

[1] Given by us, with other vessels, to the Louisiana State Museum, New Orleans, La.

been made and lived upon and that later the mixed, yellow clay had been placed above it and around it so that the depth of this yellow clay was greatest at the marginal parts of the mound. Measurements taken nearly at the center of the mound showed the upper layer of yellow clay to be about 2 feet thick, and the dark soil beneath it to have a thickness of about 3.5 feet.

Fig. 23.—Vessel of earthenware. Canebrake mounds. (Height 4.7 inches.)

Eleven trial-holes, some of which, later, were greatly increased in size, were carried down to and below the base of the mound, reaching first and last, nineteen burials, the deepest 3 feet 8 inches from the surface, and all in the black, lower layer.

All these burials had been made prior to the addition to the mound, inasmuch as there was no sign of the yellow clay in the graves in the dark soil.

Of the nineteen burials, twelve were skeletons of adults, extended on the back. In addition to these were three similar skeletons which had immediately with them collections of bones resembling bunched burials, one having one skull; one, four skulls; one, eleven skulls. There was also a burial which had

been extended on the back, but from which the pelvis and two-thirds of the thighs were wanting. Careful search was made above and below this skeleton for indications of a grave, which, passing through the skeleton in question, could have removed the missing bones, but no such grave was found.

There were also three bunched burials, two with three skulls each and one with six.

No pottery was present with the burials, and the only objects found with them were two small celts of metamorphic rock and of quartzite, respectively, and a mass of sandstone, triangular in plane, smoothed to slight concavity on four of its five sides, possibly by use as a hone. Its length is about 3 inches; its thickness, 1.25 inch; its maximum width, 2.25 inches.

Fig. 24.—Vessel of earthenware. Canebrake mounds. (Height 3.9 inches.)

It is interesting to note two mounds in this group, each containing burials with which, in one instance, were numerous vessels, and in the other, none.

Mounds on the Mott Place, Franklin Parish.

On the Mott Place, so called from the name of a former owner (also known as the Walnut Bluff Place), is a fine group of mounds, all but one of which are on the property of Mr. A. D. Simmons, residing on the place. The group, nine in number, some in, some on the border of, a cultivated field, form an irregular ellipse of which the two principal mounds constitute the western side, two form the apices of the figure, and the rest the eastern side. There are also several rises and humps in the field and in the line of the ellipse.

In major diameter the ellipse is about 850 feet, the minor diameter being about 575 feet. The mounds, to which letters will be ascribed for convenience in description, will be considered separately.

Mound *A*, within the field, is quadrangular and still preserves a symmetrical appearance. Its height is 28.5 feet. The sides face the cardinal points, or practically do so. The diameters of base are 315 and 285 feet. The summit-plateau, which is under cultivation, is 200 feet by 150 feet.

Mound *B*, 4 feet 8 inches in height, is 240 feet NNE. from Mound *A*, the distance being between the margins of the mounds, as are all such distances given of this group. This mound, which is outside the field, is of very irregular outline, partly through cultivation in the past, furrows being plainly visible upon it, and partly through the presence of a road which passes over part of it. It is between 90 and 100 feet in diameter.

Mound *C*, outside the field, 6 feet in height, is 84 feet E. from Mound *B*. Between wear and wash it has practically no regularity of outline. Its diameter of base is approximately 85 feet.

Mound *D*, also 6 feet in height, practically shapeless, is about 70 feet E. from Mound *C*. It lies without the field. Its diameters of base are 100 feet and 90 feet.

Mound *E*, 8 feet in height, lying outside the field, is 265 feet E. from Mound *D*. This mound has been quadrangular with a flat summit-plateau, but its shape is now very irregular. Its basal diameters are 90 and 100 feet; the diameters of what is left of the summit-plateau are 46 and 63 feet.

Next in line comes what may possibly have been a mound, but evidently was used as a fortification in the Civil War, which its position commanding the water well qualified it to be. It has been omitted from the group of mounds by us, as it is impossible exactly to determine its nature.

Mound *F*, lying outside the field, 12.5 feet high, is 105 feet SSE. from Mound *E*. It is square and still symmetrical. Its sides approximately face the cardinal points. Its basal diameter is 135 feet.

Mound *G*, outside the field, about 4 feet in height, has been plowed out of all semblance of symmetry, though part of a flat summit-plateau still remains. It lies 90 feet S. from Mound *F;* its diameters of base are 75 feet and 100 feet.

Mound *H*, forming part of the cultivated field, is 50 feet SW. from Mound *G*. It is a mere remnant with a height of 6 feet and a basal diameter of about 80 feet.

Mound *I*, 180 feet WSW. from Mound *H*, is on property belonging to Mr. M. A. McDonald living nearby. Its height is about 17 feet; its diameter of base (it is almost square) is about 190 feet, the diameter of the summit-plateau being somewhat more than 100 feet. This mound is fairly symmetrical, though the sides show the effects of wash in places. Many trees are on the summit-plateau.

The mounds of this group, as well as various small rises, were carefully investigated by us, but in each instance, with one exception, Mound *F*, the material of which the mounds are composed (clay, or in one or two instances

clay and sand) was of a raw appearance and gave no encouragement to look for burials, and neither bone nor artifact was found in them.

The summit-plateau of Mound *F* was composed of dark soil, which yielded twenty-six burials to eight trial-holes, some of these burials, of course, being found in the enlargement of the original holes in the process of removing burials.

The rich, dark soil of the summit-plateau, evidently a later addition to the mound, was variously between 4 and 5 feet in depth. Below it was a dark stratum about 6 inches thick, doubtless marking the one-time surface of the mound. Presumably such burials as we found in the dark soil had been buried from the present surface of the plateau, as some were between 8 inches and 16 inches deep. Pits, however, were not distinguishable in this homogeneous soil, which had been subject to no admixture on removal.

A number of graves, however, had been put down from the original surface, and these were easily traced, as the graves had been dug into clay, often in local strata differing in shade, so that the material, when returned, had a mottled appearance. For example, the bottom of the grave of Burial No. 20, the deepest found, was 6.5 feet below the present surface. At this part of the mound the dark stratum marking the earlier period of occupancy was 4 feet 3 inches from the present surface of the mound, so that the grave originally had been 2 feet 3 inches in depth.

It is difficult to compile a statement of the twenty-six burials found in Mound *F*, as some of them were of a composite character, a mingling of bones placed with burials at length. So nearly as could be determined, however, the burials were:

At full length on the back, 5.

Bunched burials, 19.

Single skulls, 2.

Of the bunched burials: seven had one skull each; one had two skulls; three had three skulls; one, four skulls; one, six skulls; one, seven skulls; one, nine skulls; one, ten skulls; one, thirteen skulls; one, sixteen skulls; one, twenty skulls.

Of the extended burials, three were associated with collections of bones which might be termed bunched burials, though account has not been taken of them as such in our enumeration. Those in question had respectively: one skull, two skulls, four skulls.

The bones in this mound were badly decayed, and when crania from it are spoken of reference is made to what once were skulls, though when found but little may have been left of them.

We shall now describe in detail some of the more interesting burials from Mound *F*.

Burial No. 9, an extended skeleton, 32 inches from the surface, had immediately with it a number of mingled bones, among which were two skulls. Near one of these four small arrowheads of flint were found, perhaps part of a deposit, the rest of which had been thrown out by the digger, though careful search with a sieve failed to yield additional ones.

Burial No. 13, a bunched burial including sixteen skulls, began 40 inches from the surface and continued on a downward slope, ending one foot deeper. The space occupied by this burial was about 8 feet by 5 feet, its thickness varying between one inch where long-bones only were present, to about 6 inches where crania were found.

Burial No. 15, a bunch, 3.5 feet down, with which were thirteen skulls. With this burial was a deposit consisting of nine small, barbed arrowheads of flint, some imperfect through former breakage, as were a large proportion of the projectile points from this mound. These particular arrowheads were not in a pile, as such deposits sometimes are, but were somewhat spread and called for careful search in the moist soil in which they lay singly.

Burial No. 17, a bunch with seven skulls, 5 feet deep, had twenty-six small arrowheads spread over a considerable area.

Burial No. 20, to which reference has been made, included twenty skulls and lay in a grave with rounded corners, 5 feet 1 inch by 5 feet 6 inches in area, the depth, as stated, being 2 feet 3 inches below the original surface of the mound and 6.5 feet below the present one. The bones in this grave were badly crushed, some retaining their shape in part, others being almost in powder. Even the skulls were flattened.

With this burial, mingled with the remnants of bones and distributed over the base of the grave-pit, were fifty-two small, flint arrowpoints, most of them serrated.

Three bunched burials, each with a single skull, had, respectively, an earthenware vessel, two undecorated, one without adornment except for series of three notches extending around the margin of the opening. These burials, with which had been placed the only earthenware vessels found by us in the mound, lay near together and presumably the same impulse prompted the placing of all three vessels.

Beyond the artifacts described, nothing was found by us with the burials, an unsatisfactory return, taking into consideration the nature of the site, which indicates occupancy by a sedentary population for a considerable period.

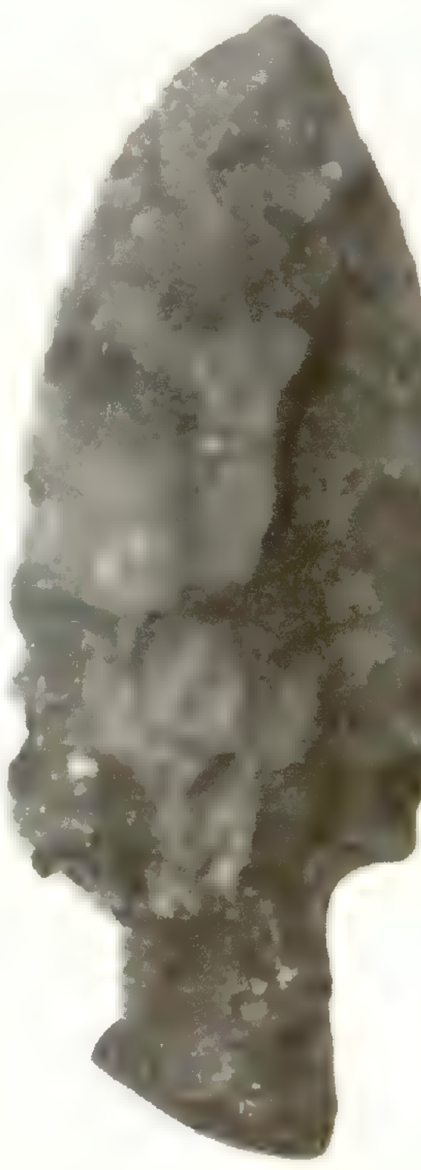


Fig. 25.—Knife of flint. Mott Place. (Full size.)

In the field near the mounds was little evidence of former aboriginal occupancy, though a few arrowheads and knives were gathered from the surface, including an interesting knife of flint, about 2.9 inches in length, showing a curve on the end of the shank, the natural curve of the pebble from which the knife was made (Fig. 25).

We found this place to be the farthest north on Bayou Maçon (so far as our search extended) where arrowheads, as a rule, are small and barbed. Farther up the bayou projectile points are much larger, many having shoulders rather than barbs.

Mounds near Hope Landing, Madison Parish.

About one-quarter mile in woods, in a westerly direction from Hope Landing, on property whose owner's name we were unable to learn, is a mound with rounded corners which are directed toward the cardinal points, somewhat of an exception, since, as we know, it is the sides of such mounds that usually are so oriented. This mound, which is square and near which is the usual depression filled with water, is 5.5 feet in height. Its diameter of base is 110 feet, the plateau varying between 60 and 70 feet. From the southeastern side a shoulder, nearly square, projects 70 feet, measured from the summit-plateau of the mound.

This mound, which was almost entirely of clay, yielded no sign of interment.

Between the mound just described and the bayou is a circular rise, about 75 feet in diameter and 18 inches in height. No evidence of the presence of artifacts or of bones was found in it.

Mounds on the Montgomery Place, Madison Parish.

On the bank overlooking the water, on the Montgomery Place, of which Judge E. C. Montgomery, of Tallulah, La., is the owner, are two mounds. The larger, 5 feet in height, according to measurement from the outside, showed a distance of 5.5 feet from the summit to a dark basal line about 3 inches in thickness. This mound, hemispherical, having a diameter of 65 feet, without marked summit-plateau, looked what it proved to be, a veritable burial mound erected exclusively for mortuary purposes.

Seven trial-holes all reached burials, almost immediately, and in the removal of these so many other burials were encountered that the central part of the mound was largely dug out. The excavation, it is hardly necessary to say, was carefully refilled, leaving the mound as much a place of refuge in case of high water as it had been before our arrival.

The mound was made of a mixture of sand and clay. The burials, thirty-six in number, all very badly decayed, were present at all depths, some being just under the surface where apparently they had been disturbed by the plow some time in the past, though the mound is outside the cultivated part of the place at present. Other burials were at intermediate depths, and a number lay on the thin, dark stratum which marked the original surface of the ground.

The burials were all of the bunched variety, one, however, lying upon, and probably including, the remains of a skeleton which lay closely flexed on the right side.

Four of the burials had been greatly disturbed in cultivation, one of them so much so that but part of a single bone remained, not enough to distinguish whether or not it was human, but as a celt lay with it, presumably the bone had formed part of a human skeleton.

The remaining thirty-two burials included crania as follows:

With one skull	14
With two skulls	9
With three skulls	2
With four skulls	3
With five skulls	1
With six skulls	1
With seven skulls	1
With twenty-seven skulls	1

In one instance remains of teeth are included as a skull, though all other parts of the cranium had disappeared.

Few artifacts were found with the burials. With one was a small mass of galena (lead sulphide); with another, a celt of volcanic rock, 4 inches in length.

Fig. 26.—Clay supports for cooking-vessels. Montgomery Place. (Full size.)

With the great burial which included twenty-seven skulls and lay about centrally in the mound, though somewhat above the base, were a rude arrowhead, two other arrowheads from each of which a barb had been broken, and a graceful lancepoint, or large arrowhead. All these were not immediately together, but lay near the bones at short distances apart. The lancepoint or large arrowhead was in two fragments which were separated by about six inches.

With another burial was an arrowhead of flint (as were all arrowheads from this mound) from which a part had been broken.

In one part of the basal layer had been a circular fireplace about one foot

in depth and 32 inches in diameter. Within this fireplace was some charcoal and a number of objects of half-fired earthenware, rude, triangular pyramids in shape, from 3 to 4 inches in height. Twenty-five of these objects, which probably were supports for vessels while cooking was in progress, and do not belong to that type of clay objects found by us in various other places this season, were practically unbroken, while many others, in fragments, were also present in the fireplace, in which, however, no parts of pottery vessels were found.

These pyramids in no instance rest steadily on their bases, which are of irregular surface and often slightly convex. On examination, however, it is found that each of these supports has one side which is flat and on which it rests firmly. Consequently, the supports were so arranged, doubtless, that three or perhaps four of them, placed on their flat sides, could firmly support a vessel. In Fig. 26 are shown two of these objects, one on its base (on which it rested unsteadily) and one lying on the single side which is flat, the other sides being like the base, of uneven surface.

A few feet from the mound just described was a small rise which proved to be of raw clay and yielded no evidence of having served as a place of burial.

Mounds on the Stevens Place, Madison Parish.

In open woods on the Stevens Place, belonging to the Ashley Land Co., of Tallulah, La., in sight of each other, are two mounds, the road which borders the bayou passing between them.

The larger, 4.5 feet in height, and 85 by 70 feet in diameters of base, proved on investigation to be of raw clay, with the exception of a small deposit of loam on the surface. No burials were found.

The second mound, somewhat smaller than the other, had been scooped out like a saucer and as it commanded the water its shape is probably a relic of the Civil War.

Mounds on the Insley Place, Franklin Parish.

The Insley Place, belonging to Mr. W. T. Insley, of Delhi, La., has a group of mounds bordering the water, though they are not in line, one being on the opposite side of a road which skirts the bayou, while the other three directly overlook the stream.

Mound *A*, the northernmost, has been lessened in extent by the road on one side and by the bayou on the other, not directly by the action of water on its side, as this place was not submerged in the great flood of 1912, but by the effect of the bayou undermining the bank below.

The mound, 4 feet in height, has a basal diameter of 65 feet through the part which still remains intact. Twelve trial-holes showed the mound to be of rich, brown loam and encountered two burials, both of the bunched variety, 30 inches and 18 inches down, respectively. The deeper burial had four skulls, two of which had belonged to children; the other, a single skull. No objects were found with either burial.

Apart from the bones were a good-sized arrowpoint of flint and three of those objects of earthenware of which a number were found throughout the season.

This mound was somewhat puzzling, as one would expect, with all the digging done, to have come upon more burials.

Mound *B*, a short distance below Mound *A*, has been quadrangular, but its shape has been so greatly altered by the making of the road, by wash of rain, and by the caving bank of the bayou, that it has no uniformity of outline. One diameter, that parallel with the road and with the river, and which no doubt gives some idea of the original size of the mound, is 215 feet. The altitude is 24 feet. Trial-holes came at once on raw clay; and great sections of the mound, exposed by wash, showed no signs of its use for burial purposes.

Mound *C*, a short distance below Mound *B*, is at present little more than a hump of compact clay.

Mound *D*, across the road, in a field, 10.5 feet in height, is fairly symmetrical. It is quadrangular, with an extensive summit-plateau in which, unfortunately, numbers of burials have been made in comparatively recent years. The mound does not exactly face the cardinal points, the longer side extending N. by W. and S. by E.; the shorter side, of course, E. by N. and W. by S. In the directions given, respectively, the diameters of base are 175 feet and 135 feet, and those of the summit-plateau, 140 feet and 70 feet.

The cultivated fields on this place gave no evidence of former aboriginal occupancy, nor was there any history there of the discovery of bones or of artifacts.

The Mound Place, Madison Parish.

The Mound Place is referred to here only to explain that what is considered a mound at this place is a tongue of the high land beginning on the opposite side of the bayou, and which, cut off by the stream, reappears as the so-called mound on the Mound Place. The few bits of pottery and occasional arrowheads picked up on the surface are relics of the time when this high ground was utilized by the aborigines.

Mounds on the Lake Place, Madison Parish.

About 2.5 miles SE. from Delhi, but on the opposite side of Bayou Maçon, on the eastern bank of Joe's Bayou lake, in a field on property belonging to Mr. Michael Crudgington, who resides there, is a site including four mounds and several low rises and ridges.

Mound *A*, the farthest north on the lake, is a rectangular mound that has been plowed over and has suffered from wash and from trampling of cattle. Its sides about face the cardinal points. The mound is 10 feet in height; the basal diameters are 125 feet and 104 feet, and those of the summit-plateau 68 feet and 57 feet. As the mound had been planted over, but two trial-holes were dug, both showing raw, yellow clay.

Mound *B*, 80 paces S. by E. from Mound *A*, near the bank of the lake, has been greatly worn and trampled by stock. The mound, rectangular, the sides approximately facing the cardinal points, has a height of about 6.5 feet. The diameters of the base are 87 feet and 102 feet; those of the summit-plateau, 36 feet and 45 feet.

Ten trial-holes showed the mound to be of dark, yellow clay and came upon five burials so badly decayed that small parts only remained, at depths ranging between 6 inches and 2.5 feet. These burials were all above a dark layer about

Fig. 27.—Vessel of earthenware. Lake Place. (Height 4.7 inches.)

3 feet down, probably caused by occupancy for a time before enlargement of the mound.

The burials consisted of three bunches of bones, each with two skulls; one with a single skull; and a skeleton at length on the back. About one foot in depth was a vessel shown in Fig. 27, which, broken when found, has since been cemented together and restored. As no bones were with this vessel, presumably the burial had disappeared through decay, or possibly its dissociation from remains was the result of disturbance.

Mound *C*, 46 paces ESE. from Mound *A*, about 3.5 feet in height and 60 feet in diameter, had been cultivated over and much worked down. Seven trial-holes showed the mound to be of dark, yellow clay, but came upon no sign of burials.

Mound *D*, 98 paces SE. by S. from Mound *C*, spread by cultivation, has a height of about 2.5 feet and a basal diameter of 85 feet. Seven trial-holes were unsuccessfully put down through light-colored clay of very unpromising appearance.

Digging in a part of the site produced a fragment of pottery showing red pigment on one side.

Mound on the Crowroot Place, Madison Parish.

This plantation, as to the name of which there seems to be some doubt, has, in view from the river, a mound about square, 6.5 feet in height and 140 feet in basal diameter. Its outline has suffered through cultivation on top and along the sides. Digging into this mound yielded no return in artifacts, nor any evidence of its having served as a place of burial.

Mounds on the Richardson Place, East Carroll Parish.

About three-quarters of a mile SW. from the regular landing on the Richardson Place, which belongs to Mrs. John P. Richardson, of New Orleans, La., in sight from each other, are two mounds. One of these, 5.5 feet in height, of irregular basal outline, is about 95 feet in diameter. As this mound had been long in use by the Richardson family as a place of burial, and numerous tombstones are upon it, no investigation of it was attempted.

The second mound has served as a site for a house, the brick chimney of which was standing at the time of our visit. The mound has been greatly altered in outline in the course of years.

Digging showed the distance from the summit-plateau to a dark stratum of soil, the original surface of the ground, to be 3.5 feet, though a measurement of height from the outside did not indicate so much.

Eight trial-holes resulted in the discovery of one burial, which was very fragmentary and in the last stage of decay, the skull being represented by remains of the teeth only. In another hole, near together, were fragments of two bowls of inferior ware, each having incised line-decoration of inferior quality. No bones were found with these vessels, and presumably the burial that almost certainly once was with them, had decayed away. No doubt other burials in this mound had likewise completely disappeared, which would account for the ill-success of our trial-holes.

Mound near Lower Jackson Landing, West Carroll Parish.

About one-quarter mile in a northerly direction from the lower landing on the Jackson Place is a mound with a circular base, 9 feet in height, the basal diameter being 115 feet.

This mound has been the cemetery of the Jackson family for more than sixty years, and, in addition, colored persons have been buried along the sides, so that digging on our part was out of the question, though we were kindly

permitted by Mr. S. T. Jackson, of Pioneer, La., to take measurements of the mound.

Mounds on the Jackson Place, West Carroll Parish.

Forming part of the great chain of mounds that begins with the one just described at Lower Jackson Landing and extends several miles up along the river to within sight of the town of Floyd, is a group of mounds on the Jackson Place, from which, unless obscured by trees, the great mound at Poverty Point is visible.

On the Jackson Place, on property belonging to Mr. George W. Montgomery, of Tallulah, La., all in sight from the river bank, is this interesting group of six mounds, excluding various humps and small rises which are fairly numerous on the place. These mounds, to which letters have been assigned for clearness in description, all of which have been quadrangular with summit-plateaus, in some instances have suffered from wash and from a too close proximity of roads. Their relative positions may be seen on the plan (Fig. 28).

Mound *A*, the southernmost of the group, has upon it the house of the manager of the plantation. The height of this mound is 13.5 feet; the diameters of base are 177 feet N. and S. and 207 feet E. and W. Those of the summit-plateau respectively in the same directions are 96 feet and 135 feet.

Mound *B*, 15 feet in height, has been about square, save that a ridge, now in the main cut away by a road, has extended from the eastern side. The diameter of base is 122 feet; that of the summit-plateau, 50 feet.

Mound *C*, 9 feet high, has been in part cut away by a road on one side and eaten into by water on the opposite side. The basal diameter remaining intact is 82 feet, and that of the summit-plateau 26 feet.

Mound *D*, having an altitude of 14 feet, has basal diameters of 155 feet N. and S., and 138 feet E. and W. The summit-plateau, which is about square, is 65 feet across. Probably the mound was square also at one time, but the sides have suffered extension through wash of rain.

Mound *E*, 9 feet high, has diameters of base of 78 feet N. and S., and 69 feet E. and W. The diameters of the summit-plateau, in the same directions respectively, are 33 and 27 feet.

Mound *F*, which has a house upon it, has been plowed out of shape by continued cultivation and has suffered by wear and by wash. A representative diameter probably would be about 190 feet, 150 feet of which would be beneath the summit-plateau. The height is 6.5 feet. Long ridges extend from this mound, one toward the north, the other toward the south.

The usual ponds, caused by the removal of material for the mounds, are present at this place.

No digging was done in the mounds on which houses stood. All others, with these exceptions, were investigated, but not in as complete a way as would have been possible had the mounds been in a territory where their complete

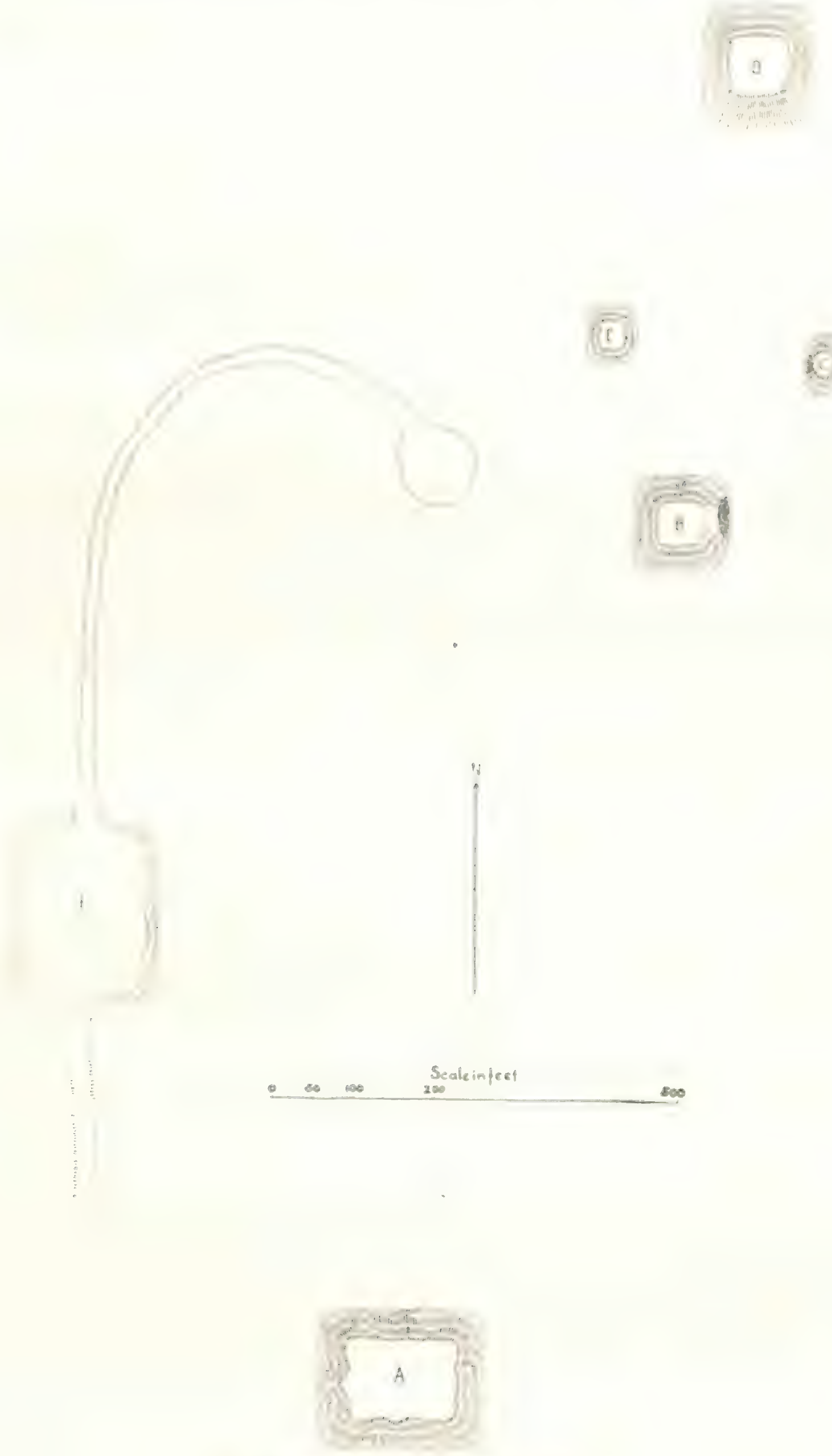


FIG. 28.—Plan of mounds. Jackson Place

destruction would have been a matter of no importance. Several humps and rises also were dug into.

Mound *C* alone yielded burials to our investigation. In this mound nine trial-holes, put down from the summit-plateau, came upon human remains in seven instances. About 2 feet below the surface was a thin, dark layer of soil, which seemed to indicate a period of occupancy and a subsequent increase in the height of the mound. The bones found by us had been buried from the surface, none of the graves having cut through the layer in question in aboriginal times. One of the seven burials noted had been greatly scattered by an interment of comparatively recent date. With some of the scattered bones was a tubular bead of red jasper, .8 inch in length.

Two other burials were very fragmentary, one consisting of part of a single bone, perhaps a remnant of another disturbance. With this was what had been an effigy-pipe of coarse limestone or of phosphate rock, greatly disintegrated. A blow from a shovel completed the wreck. The remaining four burials had been extended on the back. These bones were so badly decayed that the form of burial was merely indicated by remnants.

With one of these burials were two bowls, both badly broken, one decorated with encircling, incised lines, the other with punctate markings.

The level ground at this place showed few signs of former aboriginal occupancy, judged by débris on the surface. Several arrowpoints of flint were found, including one small and serrated. Our agent informed us that when visiting this place the preceding summer, he picked up a "plummet" of hematite, and two others were acquired by us from a colored woman living on the place.

Sites on Poverty Point, and on the Motley Place, West Carroll Parish.

Near the town of Floyd are two adjacent properties bordering the water, but well above reach of the highest flood, in all more than two thousand acres, farm-land and forest, respectively known as Poverty Point and the Motley Place, Poverty Point being the first reached by one ascending Bayou Maçon. These places, of great interest from an archæological point of view, were most courteously placed at the disposal of the Academy for investigation by Mrs. M. J. Redmond, of Floyd, La., whose property they are. To Mrs. Redmond and to Mr. M. C. Redmond, son of Mrs. Redmond, manager of these properties, the Academy wishes to express its sincere thanks. Mr. Redmond, a college graduate, and head of the School Board of West Carroll Parish, took a keen interest in the investigation and aided it in every way.

In the Smithsonian Report for 1872,[1] Prof. Samuel H. Lockett, of the Louisiana State University, Baton Rouge, La., writes:

"While prosecuting my topographical survey of Louisiana this summer, I visited, near Jackson's Ferry, 4 miles south of Floyd, on Bayou Maçon, some very remarkable Indian mounds. Six of these are within a mile of Mrs. Jackson's.

[1] Pages 429, 430.

Four of them are almost perfect; the other two are partly destroyed by the caving of the banks of the Bayou Maçon. They are connected with each other by a levee or narrow embankment of earth, making a nearly semicircular figure. There are two much larger mounds nearer to Floyd, one on Mr. Mabin's, and one on Mr. Motley's land. The latter must be between 20 and 30 feet in height. [What was formerly known as the Mabin Place is now the Poverty Point Plantation.]

"On all the sides of all of the mounds, and in their vicinity, are found great numbers of relics, such as human bones, arrowheads, 'plumb-bobs' very perfect in form and immense quantities of broken pottery. Many of the pieces of pottery are highly ornamented. From the quantity of pottery, I imagine there must have been a factory of this ware in this locality. Excavations would in all probability reveal some very valuable and interesting specimens and I think it should be done by one accustomed to searching for archæological remains."

In the opening part of Professor Lockett's statement reference is made to the mounds on the Jackson Place, our description of which immediately precedes this.

We shall now consider the sites on Poverty Point and on the Motley Place, based on our own investigation.

At Poverty Point, in full view from the bayou, rising from the flat, cultivated land, is a huge, aboriginal earthwork that at first glance almost impresses even the trained observer as being not a mound, but a hill.

This mound, which for convenience we shall call Mound *A*, is in the shape of a ridge extending north and south, the upper, central part being narrow, as may be seen by the survey (Fig. 29) made at the time of our visit by Dr. M. G. Miller. The height of the mound is 70 feet, taken from the southern end, where conditions seemed most favorable for determination, there being at that place no evidence of the depressions and ridges which were present elsewhere about the mound.

From the central part of the eastern side of the mound extends a platform directed almost due east, the outline of which has been greatly impaired by wash of rain. This platform is connected with the summit of the ridge by a causeway, shown in the plan. The basal diameter of Mound *A*, north and south, is 680 feet. East and west, including the platform, it is 690 feet.

To dig into so vast a mound as this seemed almost like the proverbial search for a needle in a haystack; nevertheless, trial-holes were put down on the crest of the mound, coming at once to raw clay, and also superficially in the platform, where burials, however, had such ever been there, evidently had long since been washed away, leaving compact, yellow clay on the surface.

This great mound (*A*) forms part of a group of six which at one time may have been in the shape of a rude circle or of an irregular ellipse. At the present time, however, rain has so eroded the high area that rises above the bayou that the only representative of the figure (if there ever was one), between north and

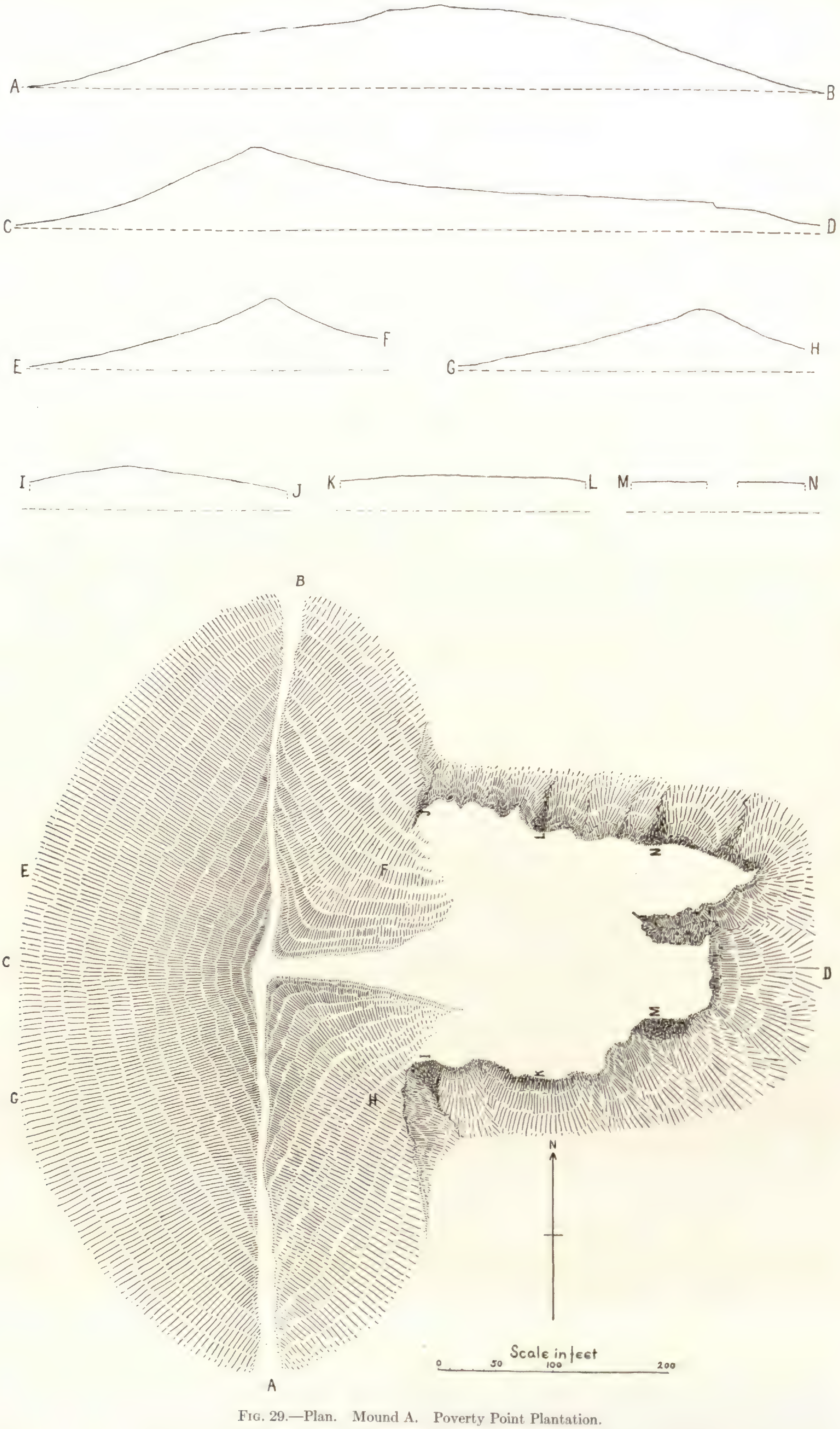


FIG. 29.—Plan. Mound A. Poverty Point Plantation.

east, is a mere remnant of a mound (*E*), about 6 feet in height, part of which has fallen into the bayou and another portion of which has been destroyed by a road. Incidentally we will say here that careful digging into this mound showed it to be entirely of mixed soil down to a base about 6 feet below the surface. In this soil was midden débris, here and there, but no sign of human remains.

Mound *B*, 186 yards[1] S. by E. from Mound *A*, 9 feet in height, has been under cultivation, and owing to wash of rain on plowed ground it has been greatly eroded and is, in consequence, of very irregular outline. Presumably it has been about square with a great summit-plateau. Its diameter of base is about 300 feet. This mound is of bright, yellow clay.

Mound *C*, 500 yards N. by E. from Mound *B*, is a well-preserved mound, 7 feet in height, in the form of a truncated cone, the diameter of base being 90 feet, that of the summit-plateau, 26 feet. This mound has every appearance of having served for burials in aboriginal times, being steep and composed of dark soil. Unfortunately, it has been honeycombed by burials in recent years.

Mound *D*, 150 yards E. by N. from Mound *C*, is slightly more than 4 feet in height. Its irregularly circular base is slightly more than 100 feet across. This mound, which overlooks the bayou, has served as a cemetery in the past and grave-stones enclosed by an iron railing are upon its plateau.

Mound *E* has been described.

Mound *F* is 430 yards N. from Mound *A*, in woods bordering a field in the lower part of the Motley Place, the other mounds described being on the Poverty Point Plantation. This symmetrical mound, 21 feet 6 inches in height and 195 feet in diameter of base, is conical, with almost no flattening at the summit. It is evident from its shape that whatever the purpose for its erection was, it cannot have been intended for a domiciliary mound. Seemingly it is composed of raw, yellow clay, and probably is without superficial burials. It may have been erected over some personage of note. Unfortunately, neither our time nor our force of men was sufficient to undertake the demolition of a mound like this.

These are the mounds (all of which but one we dug into to some extent) at present forming the group on or near the Poverty Point Plantation. Another mound on the Motley Place will be described in due course.

It is entirely possible that Professor Lockett regarded as hills the huge mound on the Poverty Point Plantation and the great mound on the Motley Place, yet to be described, an error which could easily be made by an untrained observer, and that the figures as to height given by him as to a mound on the Motley Place refer to the mound on that place already described by us.

About these mounds and between them is cultivated ground on which are numerous low ridges on which, in profusion, lay at the time of our visit, aboriginal artifacts and débris, mainly pebbles; fragments and flakes of flint; arrowpoints, spearheads, and knives, of the same material, some entire; several celts; "plum-

[1] The distances between these mounds were paced.

mets" of hematite; almost innumerable small objects of earthenware, broken and whole, to be described later; immense quantities of what is known as gravel, by the inhabitants. This material which, to some extent, has the appearance of gravel and small pebbles, and might seem to be such at first sight, proves on closer inspection to be baked clay from fireplaces of aboriginal dwelling-sites, which constant plowing has reduced to small fragments. No traces of human bones were anywhere visible on the surface.

One feature in connection with these sites impressed us greatly. Almost no fragments of earthenware vessels were in evidence. With the exception of one place in which eight bits of pottery were found, sherds were practically absent not only from the surface but from the soil thrown out in digging. It is difficult to surmise what took the place of pottery during the long time this site was inhabited; possibly vessels of wood were used. Two or three fragments of soapstone pots were found, but had such vessels been in general use, presumably more parts of them would have been discovered.

Professor Lockett's statement as to the great abundance of fragments of pottery, it must be remembered, was made in a general way, applying to three sites, and, if exact, probably had reference to the Jackson Place or to the Motley Place; for had pottery fragments been abundant at the Poverty Point Plantation in his time, it is impossible that the sherds alone should have disappeared from there, and that the great variety of other débris should still remain on the surface, as it has done.

From the surface at this place came more than two hundred entire knives, arrowpoints, and spearheads, of flint, of which thirty-one (selected by us from a much larger number) were acquired from a colored man who cultivated part of the property. No lancehead exceeded 4.25 inches in length, though fragments found in the fields indicated that some of the points must have had a length of 8 or 9 inches. A few spearheads and projectile points were found fashioned with but a single barb, such as those which have been described as coming from Catahoula Parish, La., and elsewhere. Certain of the arrowpoints show curvature on the end of the stem, which on examination proves to be the curve of the surface of the pebbles from which the arrowheads were made. Secondary work on a few of the points was noted, where apparently broken points had been resharpened or the side of a broken arrowhead had been chipped possibly to serve as a knife.

The workmanship on these implements is not above the average; serration is almost absent. The small, delicate, barbed arrowheads found in numbers farther down Bayou Maçon are represented at this place by a single example.

Of four small celts from the surface of this plantation (which were given to Mr. Redmond) one shows marked excellence of workmanship, being slender and graceful; one is of about average appearance; and two are of rude manufacture.

That the aborigines who inhabited this great site had considerable skill in working of hard stone, however, is shown by a bead of red jasper (obtained by

Fig. 30.—"Plummets" of hematite. Poverty Point Plantation. (Full size.)

us from the colored man from whom the arrowheads were acquired), unless the bead was an importation. This bead, 2.6 inches in length, with a diameter of .36 inch, has an evenly placed perforation of only .14 to .16 inch diameter.

This large bead of jasper is, however, not the record one as to size. In the Louisiana State Museum, at New Orleans, we noticed a jasper bead the measurements of which kindly have been furnished us by Mr. Robert Glenk, B.S., Ph.C., Curator of the Museum: length, 3.3 inches; diameter, .44 inch; diameter of opening, .125 inch. The bead, Mr. Glenk informs us, came from St. Landry Parish, La.

Among the aboriginal dwellers on the Poverty Point site, what are known as "plummets"[1] of hematite were greatly in vogue. Persons now living on the site tell of quantities of these objects, which they call "plumb-bobs," that have been found in the course of cultivation of the land, and the colored man from whom the arrowheads and the bead were obtained spoke of profits derived by him from the sale of these "plumb-bobs" to visitors, and displayed a number which, through partial breakage, he had not been able to dispose of.

Fig. 31.—Figurine of clay. Poverty Point Plantation. (Full size.)

There were found by us eleven hematite "plummets" (Fig. 30), ten on the surface and one in the course of the digging. They varied in length between 3.5 inches and .8 inch, some with perforations, some with grooves for suspension, one having a semiperforation. Some are rude, without regularity of outline, hardly more than masses of material on which but little work has been done. Over the surface were many fragments belonging to "plummets."

Several small balls of hematite were picked up, all of somewhat irregular outline.

From the surface also came an interesting little figurine of earthenware, representing a female (Fig. 31).

The objects of baked clay which were discovered in such numbers at this place (sixty-seven[2] entire ones being obtained), and which resemble most of those we found this season in and sometimes on the surface of various sites in Louisiana, south of Poverty Point, are of a class hitherto undescribed, so far as we can learn. A selection from those found at Poverty Point, embracing all the various forms obtained there, is shown in Plate II.

All these objects from Poverty Point lay on the surface with a few excep-

[1] As to "plummets" and objects of hematite, of aboriginal make, in general, see: W. K. Moorehead, "Hematite Implements of the United States," Bulletin VI, Department of Archæology, Phillips Academy, Andover, Mass.

[2] In addition to a selection from these, which has been placed on exhibition at the Academy of Natural Sciences of Philadelphia, others were sent to the following: United States National Museum, Washington, D. C.; Peabody Museum, Cambridge, Mass.; Yale University Museum, New Haven, Conn.; American Museum of Natural History, New York City; Field Museum of Natural History, Chicago, Ill.; Department of Archæology, Phillips Academy, Andover, Mass.; Museum of Archæology and Ethnography, Cambridge, England.

SITE AT POVERTY POINT, OBJECTS OF EARTHENWARE. (FULL SIZE.)

tions which were dug up singly in midden material, those from the surface being also with the débris of fireplaces locally known as "gravel," above referred to, or, at all events, on ground somewhat higher than the surrounding level and darker than the other ground, which evidently had been places of abode.

By consulting this report it will be noted that other objects of this class, found elsewhere by us this season, lay on the surface or in midden débris, with one exception (the Schwing place) where a deposit of them was found near a burial. As the deposit of the objects in this way was so exceptional, it is hardly likely they were ceremonially connected with burials, but presumably were employed in the general life of the people. A single deposit proves little. In the great Rose Mound on St. Francis river, Arkansas, we found with a burial a considerable deposit of cylindrical, earthenware objects such as were used by the aborigines in some regions as supports for vessels while cooking was in progress; yet nowhere else was such a deposit found by us, though numbers of the supports were discovered in other sites among midden débris.

We are greatly indebted to Mr. Charles C. Willoughby, of Peabody Museum, Cambridge, Mass., who has taken much interest in the probable use made of these clay objects, for his suggestions on the subject, which follow, and for a photograph of the clay objects used by the Paiute Indians, which is reproduced here. Mr. Willoughby writes:

"Regarding the three types of burnt clay objects of which you sent me drawings, the first form, that of the double cone, is the only one the use of which is at all clear to me. There are in our museum two similar specimens (Fig. 32)

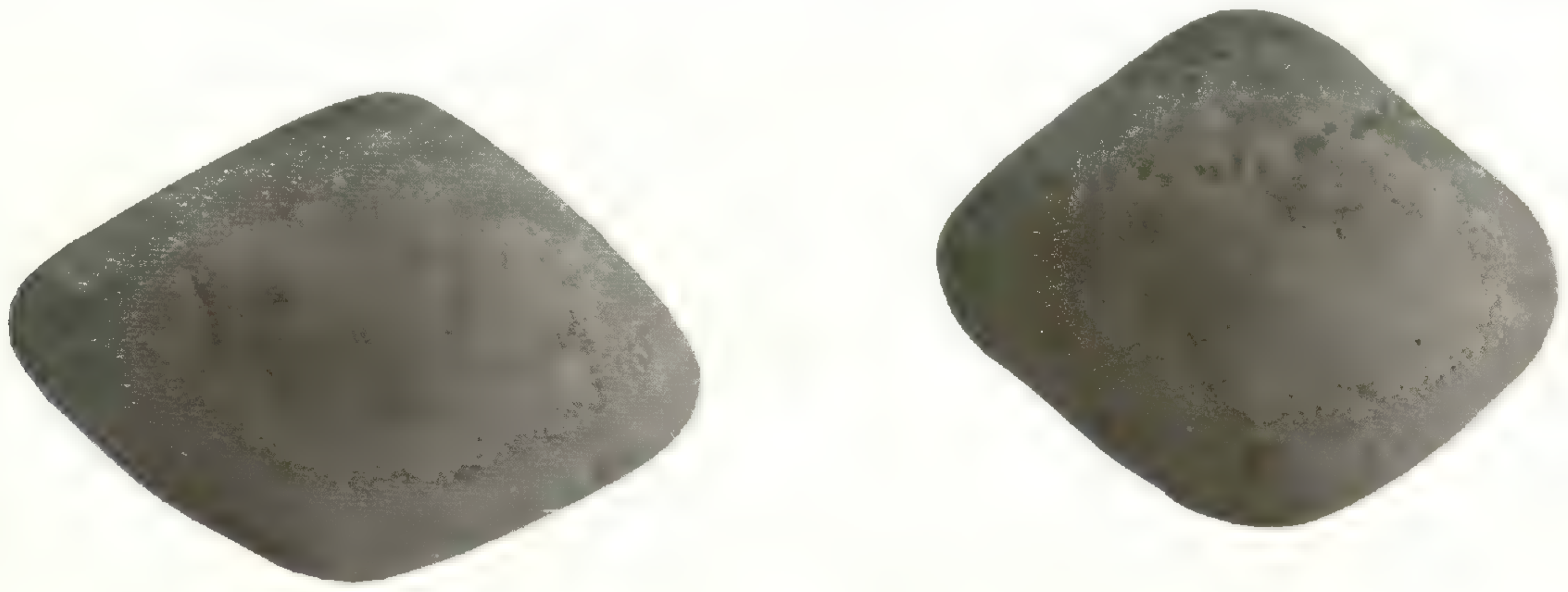


FIG. 32.—Clay cones. Paiute Indians, southern Utah. Collected by Edward Palmer, 1875. (Full size.)

of clay, obtained from the Paiute Indians by Dr. Edward Palmer in 1875 and called by him gambling cones. These, of course, were used in the well known and widely distributed 'hand game' which is commonly played with two bones, one of them being marked. One of the double cones is plain, the other has a series of dots arranged in a spiral on one of its sides. The game, as you know, consists in telling in which of the opponent's hands the unmarked cone is concealed. It has occurred to me that the double cones found by you might have been used in this game. One of your specimens [see Fig. 15] has a groove which may have served to distinguish it from its fellow, or one of a pair may have been marked with paint, all traces of which have disappeared.

"It is also possible that they may have been used in slings, as the form is similar to the well-wrought sling stone of Polynesia. You will recall that Professor Holmes obtained from the Stockton mounds of southern California, clay pellets of various forms some of which he thought might have been used in slings. One of these, which resembles somewhat your second form, is illustrated on plate 27 of the Report of the U. S. National Museum for 1900.

"As to the second form, the lump of clay with six or more depressions, it remotely suggests the worked astragalus of the deer, such as was probably used for gaming.

"As to the third form, the grooved cylinder, I have no suggestions to offer as to its possible use."

In a later communication Mr. Willoughby writes: "I have come across a picture and notice of clay balls from Missouri; see Louis Houck's 'History of Missouri,' pp. 45, 46.

"I also find that there are two or three clay double cones like yours in the Museum of Peabody Academy of Science, Salem, Mass. They are from the bed of Lake Pontchartrain, La., if I am not mistaken."

The deposit of clay objects found by us in a mound near the Schwing Place, and described in this report, was made up of two varieties, namely, double cones and similar forms having longitudinal furrows in addition (see Fig. 2).

It has occurred to us that these objects, if used in the hand-game, were employed by making a double cone and one with furrows constitute a pair, the required difference between the two being attained in this way.

Mr. Stewart Culin, author of "Games of the North American Indians,"[1] in reply to a request for his views as to the clay objects in question, kindly has sent the following statement: "I am unable to form an opinion as to the probable use of the clay objects. They may have been used in games, but from any knowledge of existing games I have no assurance that they were thus employed."

Persistent digging was done at Poverty Point into the various dwelling sites in the fields, to which we have referred, but though soil indicating deposit through long habitation was gone through to considerable depths, and various relics were found, including a number of the small, earthenware objects described and the "plummet" of hematite referred to, no skeletal remains were encountered. Presumably, burials had been made apart from the places of abode or had been destroyed during the long-continued cultivation of the place, especially if buried more or less superficially. It was, of course, impossible to make a thorough examination of so great a site as the one under description, but it is very unlikely, had burials been in the places investigated, we could have failed to find some in the great amount of digging that was done. It is significant, too, that no history of the discovery of human bones is to be had from persons living on the place or connected with it. The bones seen by Professor Lockett at the time of his visit more than forty years ago, may have been on the other sites referred to by

[1] 24th An. Rep. Bur. Am. Ethn.

him or may long ago have disappeared from the surface, since fragments of bones are far more subject to disintegration and to decay than are pottery fragments.

A description has been given of Mound *F* on the lower part of the Motley Place which, as stated, is adjacent to, and above, the Poverty Point Plantation.

About one mile N. by E. from Mound *F*, across part of the cultivated portion of the Motley Place and in view from Mound *F*, is another mound, 51 feet in height, and somewhat resembling the great mound on Poverty Point, as it is in the form of a ridge, but in this instance extending E. and W. It presents a steep side to the north. From the southern side of the mound, below the upper part

Fig. 33.—Implement of flint. Motley Place. (Full size.)

Fig. 34.—Charm-stone of chalcedony. Motley Place. (Full size.)

of the ridge, is an extension sloping downward to the south until it reaches a level terrace 50 feet in width and somewhat less than 6 feet in height. This terrace, very symmetrical, slopes to eastward and westward, and seemingly joins the general level at the extremities.

In places in the mound are deep gullies wrought by wash of rain over clay insufficiently protected by roots of trees, which have impaired the symmetry of parts of the mound. Nevertheless, this superb earthwork, on its terrace facing the plain to the south, has the appearance of a great temple, and such probably it was.

So nearly as can be determined, the diameters of the mound at the present time are: N. and S., 400 feet (including the extension but not the terrace); E. and W., 560 feet.

An examination of the gullies which have laid bare large sections of the mound and do more to aid examination of the earthwork than a long period of

digging could do, showed no sign of mixed soil or of the presence of artifacts or bones.

A large part of the cultivated portion of the Motley Place has been used for the production of rice, and if any aboriginal débris lay on the surface in the past it was not evident at the time of our visit, when the fields, no doubt, were covered to some extent with sediment from water introduced for the cultivation of this plant.

A field, however, forming part of this great property, let to a colored man named James Green, had on the surface occasional fragments of earthenware, bits of flint, and a few arrow points, ten of which, unbroken, were gathered by the party. One of these, of somewhat unusual shape, is shown in Fig. 33.

We were informed by the tenant of this field that he frequently found objects of interest while plowing, and we obtained from him a "plummet" of hematite, 2.5 inches in length, grooved for suspension, and a superb charm-stone of chalcedony, shown in Fig. 34, wrought with the greatest symmetry, elongate-ovoid in form. We were informed by the tenant, from whom this was acquired, that it was the property of his little daughter and that she, at Easter time, when the custom to "pick" eggs obtains (namely to tap eggs together, the egg first showing a break becoming the property of the owner of the unbroken egg), was accustomed to color the ornament and to conceal within her hand that portion which is narrow and grooved and to "pick" the other end against eggs belonging to her playmates. Our informant added that the child had been a constant winner.

No trace of coloring, however, now mars the milk-white purity of the stone.

BAYOU D'ARBONNE, LOUISIANA.

Bayou D'Arbonne, rising in northwestern Louisiana, flows easterly to its union with Ouachita river, a short distance above the city of Monroe, La. This stream is navigable for about 32 miles up to its union with Bayou Corney, while Corney is open for navigation about 8 miles farther, to Stein Bluff, from which point our agent, Capt. W. D. Platt, preceded us in a search to the union with Ouachita river.

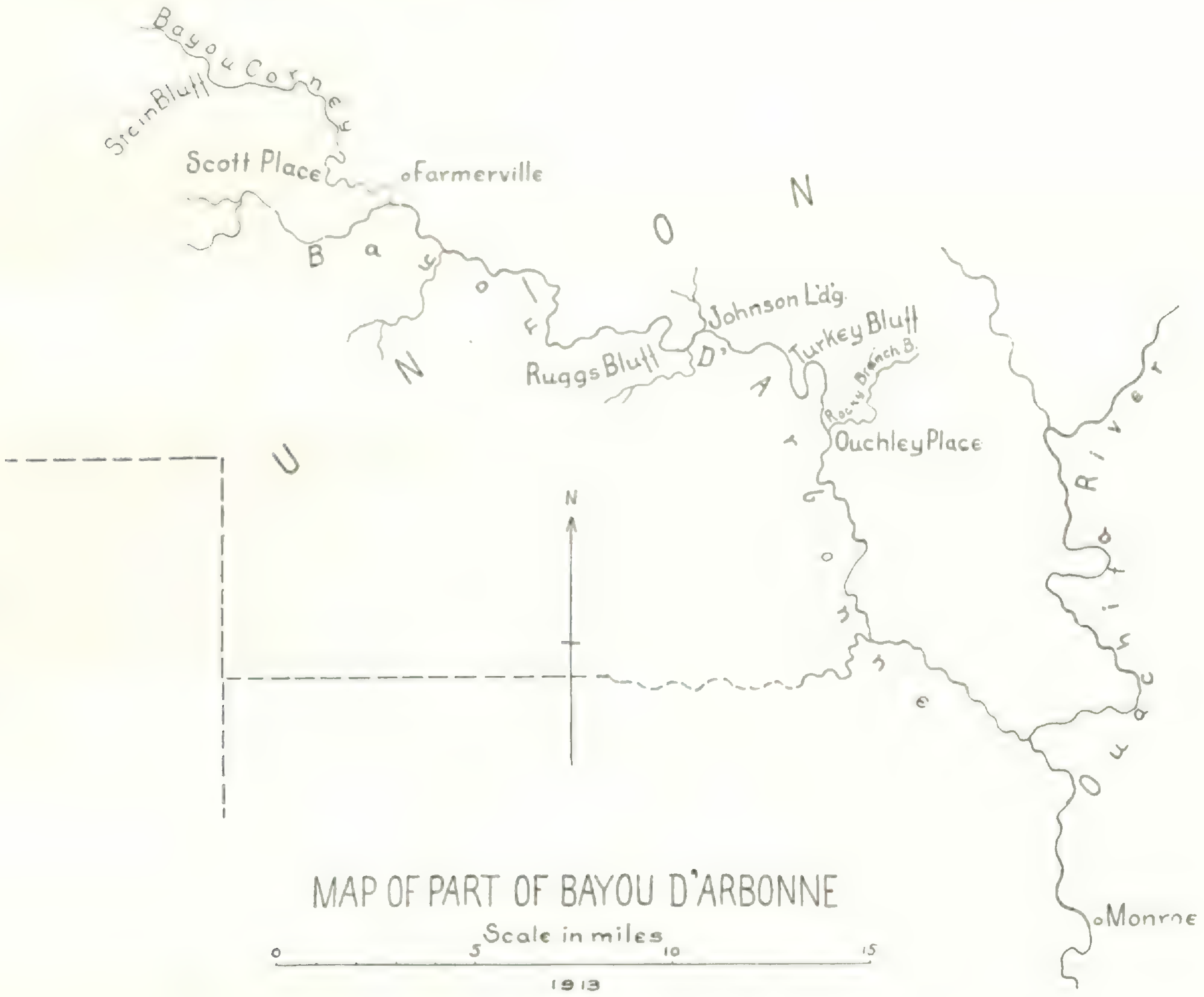
Our investigation covered Bayou D'Arbonne to a point some miles above its union with Corney and included three or four miles of Bayou Corney to the Scott Place, above which our agent had found no aboriginal sites.

Most of the lower 20 miles of Bayou D'Arbonne is low-lying and was under water at the time of our visit. Our agent found no aboriginal sites on this part of the Bayou.

Sites Investigated.

On the Ouchley Place, Union Parish.
Near Turkey Bluff, Union Parish.
Near Johnson Landing, Union Parish.

Near Ruggs Bluff, Union Parish.
On the Scott Place, Union Parish.



Site on the Ouchley Place, Union Parish.

The Ouchley Place, belonging to Mr. R. Ouchley, who lives upon it, is about one-half mile back from Bayou D'Arbonne, at a place where it is joined by Rocky Branch bayou.

Part of the Ouchley Place is a large field along the side of which nearest the bayou are a number of humps and rises. Some of these were dug into by us unsuccessfully, the soil being without evidence of having served as dwelling-sites to any great extent. On the surface of these slight elevations, with one exception, was midden débris in small quantities, and it is probable the sites had served as places of abode for short periods or that the midden material had been washed away.

One small hump had, superficially, considerable débris, including a number of small, barbed arrowpoints of flint. This rise was dug into with especial care, and black soil showing former occupancy was found to a depth of about one foot. No burials were encountered.

Site near Turkey Bluff, Union Parish.

Immediately back of the landing at Turkey Bluff are low hills. On level ground, at some elevation above the bayou and in sight from it, is a field forming part of a place belonging to Mr. S. J. Wall, of Wall Lake, La. This field, fallow at the time of our visit, had on the surface slight traces of former occupancy by aborigines and has the reputation of having been a camping-site for them. The made-ground, however, presumably had disappeared through cultivation and through wash, taking with it any burials that may have been present.

Site near Johnson Landing, Union Parish.

About one-quarter mile in from Johnson Landing is the property of Mr. J. S. Meeks, resident upon it. On a cultivated field forming part of the place was some débris, among which were found several arrowpoints of flint. Mr. Meeks informed us that thirty years ago he had plowed up numerous human skulls in a part of this field, but that for a considerable time he had found no bones of any kind.

A number of trial-holes put down at the spot designated by Mr. Meeks came upon no sign of burials, though a bicave of fine-grained sandstone, about 2 inches in diameter, was unearthed. Presumably at this place all burials had disappeared in the course of cultivation.

Site near Ruggs Bluff, Union Parish.

A site near Ruggs Bluff, consisting of a field on which were hammer-stones, bits of flint, and a few small fragments of pottery, was dug into by us but found to have lost by cultivation any superficial soil and burials it formerly may have had.

Site on the Scott Place, Union Parish.

The Scott Place, on Bayou Corney, which, as stated, is an affluent of Bayou D'Arbonne, belongs to Mr. J. D. Baughman, of Farmerville, La. On this place, in full view from the stream, on ground far above the reach of the water, is a well-preserved, quadrangular mound, with angles slightly rounded by erosion. This mound, somewhat more than 11 feet in height, practically square, has a basal diameter of about 110 feet. Sixty feet, approximately, is the diameter of the summit-plateau. The four corners of this mound are not exactly directed toward the cardinal points, though they are within a few degrees of being so, the eastern corner, for instance, being somewhat south of east, about the direction the aborigines would obtain from the sun in winter.

In the hope that superficial burials had been made in this mound, which evidently had been domiciliary, trial-holes were sunk over the summit-plateau, but almost at once reached hard, raw clay without any admixture of midden material.

In sight from the mound just described, in a southerly direction from it, immediately at the farther side of the public road, is a mound with a flat top,

somewhat more than 4 feet in height, measured from the western side, though from the eastern side, the mound being on a slope, the height seems considerably greater. The base of the mound, irregularly circular, is about 75 feet in diameter; the summit-plateau is 32 feet across.

Seven trial-holes dug from the summit-plateau of the mound showed it to be of raw clay and sand without admixture of dark material indicating the presence of burials. These holes, carried below the base-line which was at a depth of from 6.5 to 7 feet, intersected no pits of any kind, nor was there any sign of a central pit extending below the base.

Five feet below the central part of the summit-plateau was a basin-shaped fireplace, 3 feet 8 inches across at the top and 21 inches deep. Filling the lower part of the fireplace was a layer of ashes and burnt material 9 inches in thickness.

In sight from the principal mound, in a southwesterly direction from it, are two other mounds, while a third lies a short distance to the westward. These mounds, irregularly circular as to the bases, the diameter of each of which is about 50 feet, are respectively 2 feet 2 inches, 1 foot, and 2 feet 3 inches in height. They are composed of raw, yellow clay without any indication of use for burial, as was shown by many trial-holes sunk through them to sand on which they rest.

South of the mound is a great field, fallow at the time of our visit, on which, here and there, were relics of aboriginal life, including two arrowheads of flint. Doubtless the grass covered much that could have been apparent on plowed land, and possibly through the presence of vegetation an aboriginal cemetery was concealed.

SALINE RIVER, ARKANSAS.

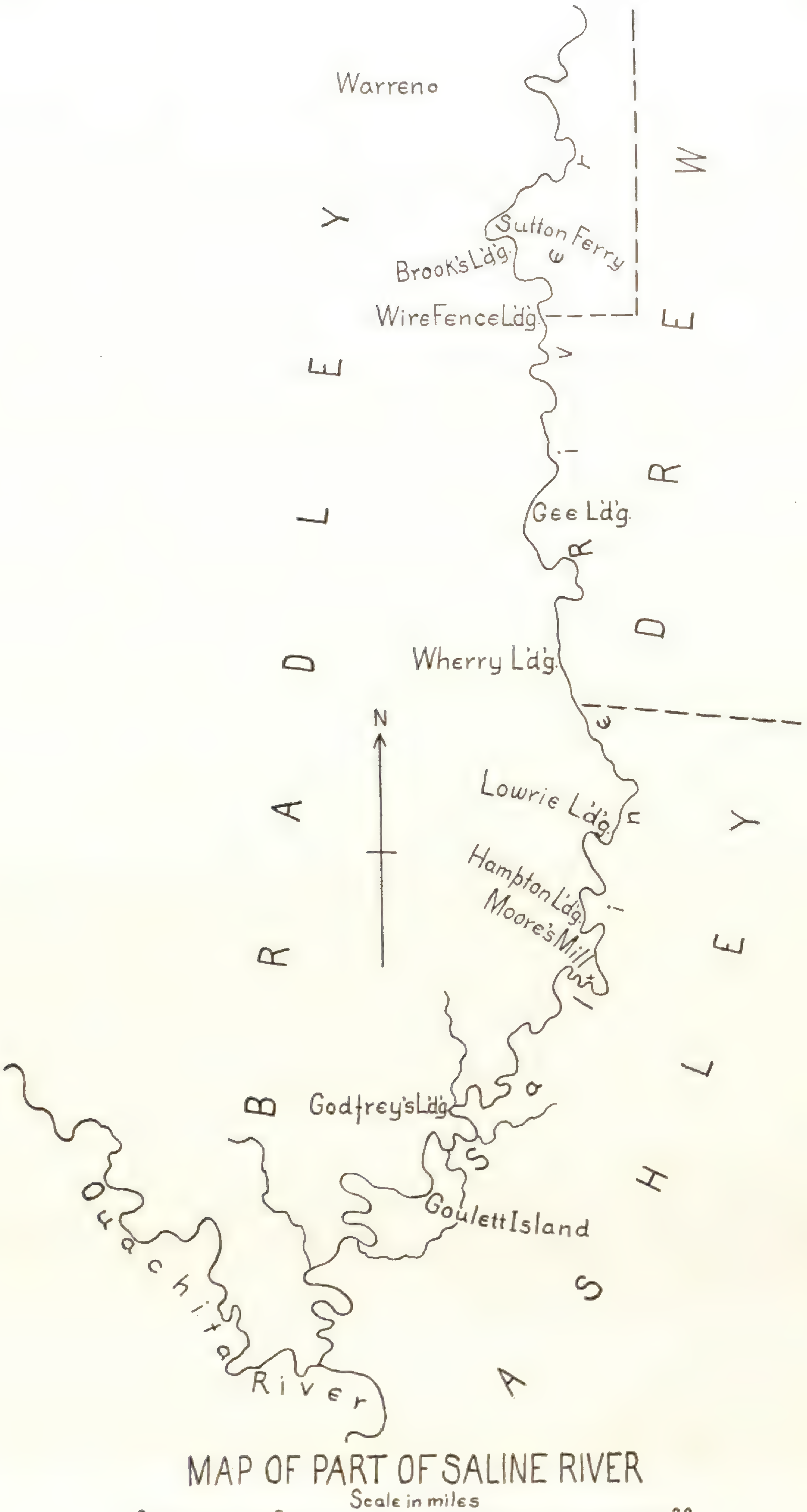
Saline river has its source in central Arkansas, not far west of Little Rock, and pursues a southeasterly course to its union with Ouachita river, about a dozen miles above the Louisiana border.

Navigation on this stream is blocked by a bridge, 58 miles by water above its mouth. The territory from this bridge to the river's junction with the Ouachita was searched by Capt. W. D. Platt prior to our coming, who found great difficulty in obtaining information as to mounds, owing to the sparse population along the banks of the stream.

The river was investigated by us for a distance of 50 miles, as the river runs, no aboriginal sites of interest having been discovered farther north.

Along that part of Saline river investigated by us no burials were found in cemeteries, only in mounds, and all mounds found by us along this stream were low and without symmetry—mere irregular rises of the ground, none apparently having been otherwise in earlier times.

The custom of placing artifacts with the dead evidently was not practised along that part of Saline river investigated by us, with the exception of pottery, and that to a very limited extent. This pottery is of inferior ware and without polish, though, as might be expected of a region lying south of Arkansas river,



MAP OF PART OF SALINE RIVER

1913

a considerable proportion of the vessels bear decoration. This decoration in nearly every case is rude. The use of pigment (red) in the decoration of pottery was very limited. No polychrome combination was found, nor was such expected south of Arkansas river.

In form the vessels are ordinary. The water-bottle was met with but once. The ware, while soft and coarse, is not thick, and the vessels are fairly symmetrical as a rule. In a word, this pottery belongs to the class found in the lower Mississippi region, but is of an inferior grade in that class.

Sites Investigated.

On Goulett Island, Ashley County.
Near Godfrey's Landing, Bradley County.
Near Moore's Mill, Bradley County.
At Hampton Landing, Bradley County.
Near Lowrie Landing, Bradley County.
Near Wherry Landing, Bradley County.
Near Wire Fence Landing, Bradley County.
Near Brooks Landing, Bradley County.
Near Sutton Ferry, Bradley County.

Site on Goulett Island, Ashley County.

On Goulett Island is a site with a number of small mounds of irregular outline, some in sight from the landing and all near one another, on property under the management of Mr. W. J. Wright, who resides about three miles farther up the river.

One of these mounds, largely of clay, is 2 feet in height and 50 feet across its irregularly circular base. Of six trial-holes three came to undisturbed, yellow clay at a depth indicated by the height of the mound as determined by us from the outside.

Three holes, however, extended through disturbed soil, evidently graves, to a greater depth, the deepest being 4 feet 4 inches.

One of these trial-holes, about centrally placed in the mound, came upon a fragment of human skull at a depth of 2.5 feet, and in another of the holes was a small fragment of pottery, of excellent ware, bearing deep and evenly-cut, lined decoration. An arrow head or a knife, of flint, and a small deposit of pebbles also came from the mound.

Another mound of the group, also circular, having a greater admixture of sand than was present in the preceding mound, is somewhat less than 2 feet in height and 40 feet in diameter. Undisturbed, yellow sand was reached at a depth about equal to the height of the mound, without the discovery of bone or of artifact.

Near these two mounds is a level space covered with rich, black loam to a depth of from 12 to 18 inches, containing midden débris here and there. No human bones were found in it.

A little farther north is another mound which probably had been about circular, but though in thin woods, like this entire site, it most likely had been under cultivation at one time and had been plowed down considerably and extended. Its height is between 2 and 3 feet; its diameter, about 80 feet. It is composed of clay with an admixture of sand.

FIG. 35.—Vessel of earthenware. Goulett Island. (Height 5.2 inches.)

Twelve trial-holes sunk into what was probably the original mound, came upon human remains in many places, sometimes in two or three parts of a single hole. The burials were all near the surface, the deepest being but one foot down, while the rest were from 4 to 8 inches in depth.

As may be supposed, most of the burials had been much disturbed by the plow; six, however, were unearthed nearly intact, although all were badly decayed. These six skeletons lay extended on the back; two heading S.; three, S. by W.; one, SSW.

At the right of the skull of one skeleton was a pot of inferior ware, having by

way of decoration incised, upright lines around the neck. The body, which is without decoration, is hemispherical, the neck upright, the rim flaring.

Near the skull of a badly disturbed skeleton was that part of a vessel which plowing had left. On four sides of the body are double, upright, beaded fillets, the most of the surface being covered with a design of trailed lines (Fig. 35). This vessel has been restored to some extent.

Near fragments of bones lay a rude knife of chert.

Another mound, about 3 feet in height and 80 feet by 90 feet in diameter, proved to be of raw clay with no sign of interments.

Site near Godfrey's Landing, Bradley County.

About one-quarter mile in a SW. direction from Godfrey's Landing is a small clearing in woods, which has been under cultivation for a considerable period. It is higher than much of the surrounding country, and we were told it was not submerged in the great flood of 1912. This field forms part of a property under management of Mr. W. G. Wright, who resides on the place.

The field to a depth of about 18 inches is covered with a black, sandy loam which evidently had received its color through aboriginal habitation. Scattered over the surface were fragments of human bones, bits of pottery of inferior ware and rude decoration, parts of mussel-shells, and three arrowheads of flint, two small and barbed, one elongated without barbs.

Considerable digging by us in this field showed burials to have been comparatively numerous there. Many, however, had been disturbed, by cultivation in most cases, occasionally by the rooting of hogs.

The burials lay none deeper than 18 inches, sometimes in the dark loam, sometimes on the undisturbed, yellow sand which underlay the loam.

In addition to the disturbed burials, five others were unearthed, complete though badly decayed, four of adults, one of an adolescent, all extended at full length on the back, the heads variously directed. No artifact lay with any burial at this place.

Site near Moore's Mill, Bradley County.

At a place called Moore's Mill, probably through the former presence of a sawmill there, and which is known also as the Jack Fogle Place, after the name of a former owner, is a property belonging to Mr. Samuel Clanton, who lives near Johnsville, Ark.

On this property, which is immediately on the river bank, are three mounds, two within a large cultivated field and one just outside.

Over the field in places is much dwelling-site débris, including many bits of pottery of rather less than average excellence.

There were collected by the party: three small celts, given away before identification as to their material; many delicate, barbed arrowheads of flint; one barbless point of the same material, nearly three inches in length; a flint knife with rounded cutting edge.

Toward the NE. end of the cultivated field was a rise above the level of the surrounding territory, having a maximum height of 2 feet. The diameter was about 70 feet. It was apparent, however, that the height of the mound had been impaired through cultivation and that the consequent spreading of material had added to the original diameter.

Over the surface was much midden débris, including a fragment of pottery on which was red pigment, and bits of human bones, among which was part of a lower jaw.

With the aid of converging trenches it was determined that a space about 27 feet by 43 feet contained what burials remained, most of which, it may be said, were found in the NE. part of the mound where, according to a former owner of the place, burials had been plowed up by him.

The space described was completely dug out by us to a depth of from 2 to 3 feet, where undisturbed material of light color was encountered. The mound itself was mainly a brown mixture of sand and clay, the sand predominating.

As the digging progressed, it became evident that the mound, when higher, had contained numerous burials, but that many of these, if not most of them, had been plowed away wholly or in part. Many parts of skeletons through which the plow had gone were encountered, and scattered bones also were numerous. The deepest burial was 14 inches down.

Excluding recent disturbances and several aboriginal ones made by intersection of graves, seven burials were encountered, all of adults and all extended on the back, except one which lay partly flexed on the right side, the head directed ENE. The other burials headed as follows: NE., 3; ENE., 2; SW., 1.

With the burials were five vessels of inferior ware, broken and whole, and two vessels, similar to the others in quality, were met with apart from human remains.

Most of the vessels exhibit some attempt at decoration, scanty as a rule and poorly executed. One pot has incised lines around the neck and a beaded margin; another has a scalloped neck and series of incised, festooned lines on the upper part of the body. Apart from bones was a small celt evidently smoothed from a pebble.

In the northern corner of the field is a mound or a ridge of irregular shape and height. The maximum height slightly exceeds 2 feet; the greatest breadth is 100 feet. The length of the ridge, which evidently increased under occupancy, is 740 feet approximately. Near each end of it is a kind of hump, that nearer the river having been the cemetery of the Fogle family, we were told by a former owner of the place.

Holes sunk in the other hump passed through the dark, mixed material of the dwelling-site to hard clay at a depth of about one foot. In other parts of the ridge the mixed soil is deeper, sometimes reaching a depth of about 2 feet. Fragments of human bones were on the surface at one place, and there we came upon a badly decayed skeleton partly flexed on the right side, the head directed to the east.

Near the ridge are two deposits of mussel-shells, mostly broken—refuse from aboriginal meals.

Outside the fence, near the river, is a small mound having a large depression in the central part where, presumably, some excavator had been at work.

This place, no doubt, had been a site of some importance, but long-continued cultivation presumably had destroyed most of the burials that formerly had been there.

Site at Hampton Landing, Bradley County.

Immediately at Hampton Landing is cleared ground, higher than most of the surrounding country, belonging to Mr. Edward Outlaw, who lives about one mile distant. On the surface of this clearing were a few scattered bits of flint and of inferior pottery. A small, barbed arrowhead of flint was picked up also.

The rich layer of sandy loam on the cleared ground was not much more than a foot in thickness. Of two burials found in this layer one had been badly disturbed and consisted of only a few scattered bones.

The other burial, an elongated layer of a single thickness of bones, contained parts of at least seven skeletons, as fragments of that number of skulls were found. These skulls had been placed together at one end of the layer.

Near the skulls was a small lump of red oxide of iron, the only object found with the interment.

Site near Gee Landing, Drew County.

Not far from Gee Landing is a farm on which our agent saw considerable débris on the surface and thought it likely that it marked a former dwelling-site of the aborigines. The owner of the place, however, demanded a price for the investigation, which we were not willing to accord.

Site near Lowrie Landing, Bradley County.

Lowrie Landing has behind it a narrow strip of woods which is submerged in periods of high water. Back of this is a large field on elevated ground, forming part of the property of Messrs. Howard and David Webb who live somewhat farther back in the country. At several places in this field the ground was dark and had on the surface considerable midden débris, including bits of coarse pottery, broken arrowheads of flint, hammer-stones, etc.

In but one of these promising looking places, however, were burials met with, their presence being indicated by fragments of human bones on the surface. Considerable digging unearthed four burials, all badly disturbed and scattered, as hardly could have been otherwise, lying as they did but a few inches below the surface. No artifacts were associated with them.

Several low, irregular rises of the ground on the borders of the field were dug into without success, one being a shell-heap from which the following shells have been identified by Doctor Pilsbry: *Quadrula plicata, Q. nodifera, Q. trigona,*

FIG. 36.—Femur with union after fracture. Wherry Landing. (Full size.)

Q. metanever, Q. tuberculata, Q. reflexa, Unio gibbosus, U. crassidens, Obovaria castanea.

Mound near Wherry Landing, Bradley County.

In sight from Wherry Landing, in a cultivated field forming part of the plantation of Mr. J. M. Ferrell, of Johnsville, Ark., is a mound of irregular outline, probably averaging about 60 feet in diameter, though its original extent is difficult to determine, as the mound had been under cultivation and, it is said, had been surrounded by water in flood-times. An old colored man, owning an adjoining field, informed us that the mound had not been cultivated since 1877, when plowing over it was abandoned owing to the number of human bones brought to the surface. The mound, about 3 feet in height, is covered with a growth of pine trees, which somewhat interfered with complete investigation.

This mound, of sand with a slight admixture of clay, was fairly riddled with trial-holes by us, nearly all of which, except those in the outer parts, after reaching burials, were considerably extended.

No burial was found at a depth greater than 14 inches from its upper surface, though discolored sand in places in the mound went to a depth of 2 feet 8 inches before yellow, underlying sand was reached.

There had been considerable aboriginal disturbance in the mound owing to burials cutting through others. When but few scattered bones were encountered, presumably the result of such disturbance, they were not included in our list of burials.

An interesting feature in this mound was the placing by the aborigines of skeletons in a way that the heads were directed toward the south, so far as we could determine, the heads of all undisturbed burials being thus arranged.

We shall now detail each burial, the skeletons, when not otherwise described, having been of adults, at full length on the back. No bones were in a condition to save.

Burial No. 1, a disturbance probably caused by the placing of Burial No. 2. This burial (No. 1) had sustained in life a fracture of the thigh, which had united as shown in Fig. 36. This bone was presented by us to the United States Army Medical Museum, Washington, D. C.

Burial No. 2, heading SSE., had at the right side of the skull an undecorated pot with flaring rim.

Burial No. 3, with the skull directed SSE., had over the lower part of the left leg an undecorated vessel, somewhat broken, containing a mussel-shell.

Burial No. 4, the head pointing SSE., had at the right forearm what remained of parts of eight tools made from scapulæ of deer. These tools, all of the lower parts of which were missing through decay, each had a perforation made in the following way: the head of the scapula had been removed, a hole had been made down the neck of the scapula to communicate with another hole pierced through one side of the neck. With these fragmentary tools were two parts of the lower jaw of deer.

Near the pelvis of the skeleton, between the thighs, was a celt less than 2 inches long, probably smoothed down from a pebble.

Burial No. 5, head SE., had near the head a pot bearing, by way of decoration, rude impressions of a pointed tool.

Burial No. 6, head SE.

Burial No. 7, a disturbance.

Burial No. 8. This skeleton lay with the trunk extended on the back and had the right thigh and leg flexed toward the trunk at somewhat less than a

Fig. 37.—Pipe of sandstone. Wherry Landing. (Full size.)

right angle. The left extremity was missing, probably through the proximity of another grave. At the left humerus was a vessel with flaring rim, having indistinct trailed decoration.

Burial No. 9 had the skull directed nearly SSE.

Burial No. 10 lay with the head pointing SSE. At the outer side of the right elbow was an effigy-pipe of sandstone, shown in two positions in Figs. 37, 38

and in section in Fig. 39. This pipe, 4.75 inches in height, is coarsely made and has suffered superficial disintegration. It represents a human figure seated on its lower limbs, which extend under and inward diagonally. The figure, which faces the smoker, holds a biconical pipe. While in other respects this effigy-pipe is not of especial interest, the fact that it has an entire biconical pipe, that is to say not only the bowl but the portion made for the insertion of the stem, places it among a class that has few representatives. Almost invariably when

FIG. 38.—Pipe of sandstone. Side view. (Full size.)

a human figure is represented holding any part of a pipe, it is the bowl alone, and the stem of the pipe has an orifice to receive it in the back of the figure, and not like the bowl, outside the figure. In fact the only other exception to this rule that we know of (though no doubt there are others) is the effigy-pipe of earthenware found by us last season in the mound at Gahagan, La., Red River, and shown in our "Some Aboriginal Sites on Red River,"[1] Figs. 13, 14, 15, 16, 17.

[1] Journ. Acad. Nat. Sci. of Phila., Vol. XIV.

Mr. McGuire's exhaustive work[1] shows no figure holding a biconical pipe.

Burial No. 11, a bunched burial, had with it a bottle, the body and the neck being a few inches apart, the proximal end of the neck turned from the body of the bottle, showing that the break had occurred before interment. On the body and neck of this bottle, in places, is decoration traced with a point in the rudest possible manner. Here and there in the lines are traces of red pigment.

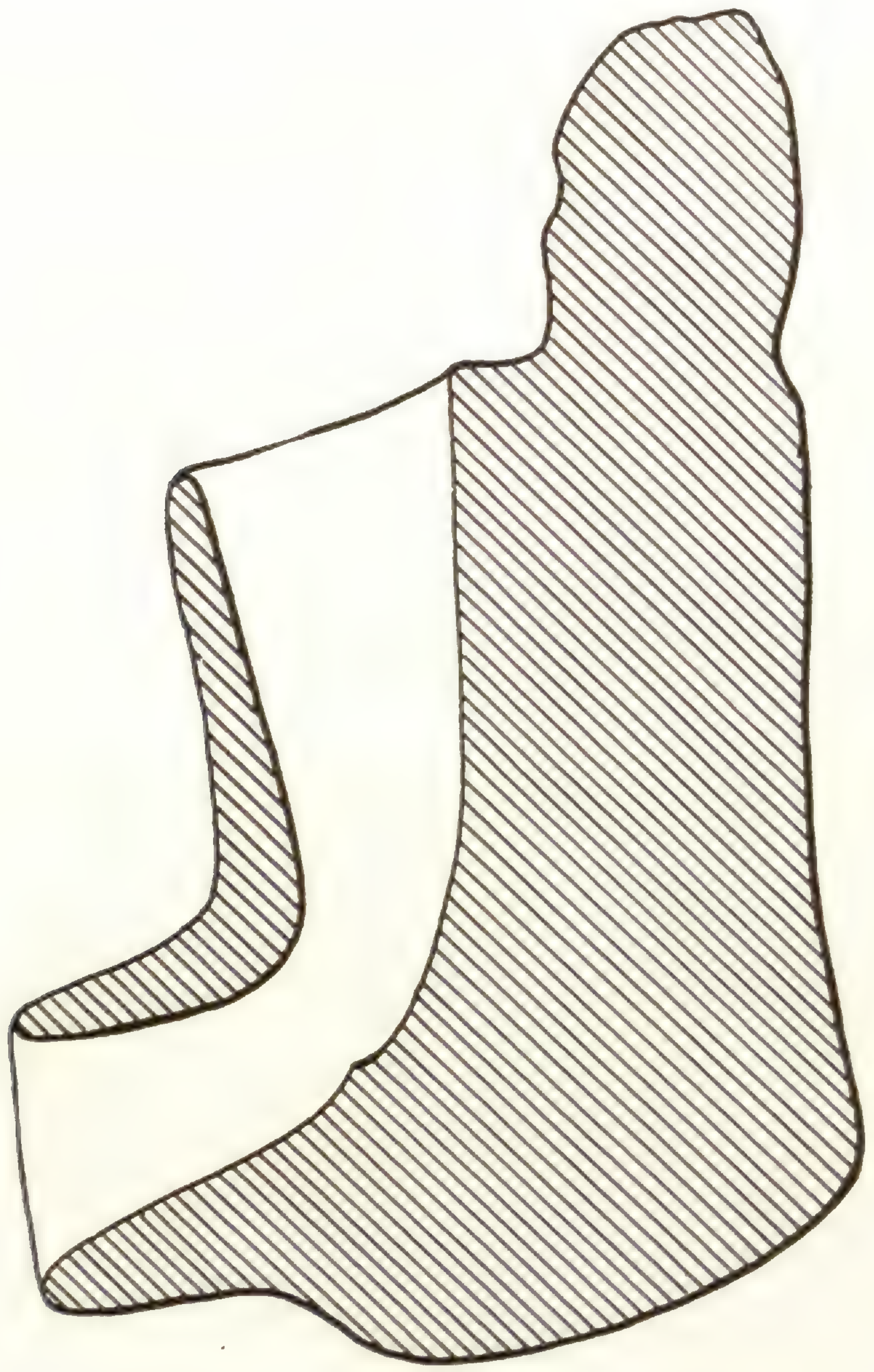


FIG. 39.—Pipe. Vertical section. (Full size.)

Burials Nos. 12 and 13 lay with the heads directed SSE.

Burial No. 14. This skeleton, heading SSE., is the one whose grave cut through Burial No. 7. On and at the side of this burial (Burial No. 14) bones had been piled, covering the skeleton closely from the skull to the pelvis, inclusive. Farther down, the bones continued, but were less closely placed. In this collection of disconnected remains were four skulls.

[1] J. D. McGuire, "Pipes and Smoking Customs of the American Aborigines," Report of the U. S. National Museum, 1897.

With these bones was a rude arrowhead or knife, of flint; a slab of ferruginous sandstone; a spherical pebble about the size of a pigeon's egg; nine ulnæ of deer, with articular parts remaining. Three of these last were unfinished tools; three had rounded points; one, a sharp point; and two had the points absent through breakage.

Burial No. 15, another disturbance cut through by Burial No. 14. At the right of the skull lay a vessel, badly crushed by roots, upon which had been an incised design of some kind.

Burial No. 16 had the head directed S. At the right of the skull was an undecorated bowl, beside which was another bowl in small fragments, which had borne a rude, trailed design.

Burial No. 17. A small bunch with an undecorated pot in association.

Burial No. 18. A skeleton with the head directed S., having a small deposit of bones in connection with it.

Burial No. 19, with the head directed S. by E., had nearby a few scattered, human bones, perhaps a disturbance.

Burial No. 20 lay with the head S. by E. At the right side of the legs was a bunched burial, including four skulls. With this latter burial was an undecorated bowl crushed to fragments.

The ware of all the vessels from this mound is of inferior quality.

Site near Wire Fence Landing, Bradley County.

About one-half mile southwestwardly from Wire Fence Landing is a property including two fields which until very recently belonged to the Bradley Lumber Company, of Warren, Ark., but of which Mr. William Harding, who lives about four miles distant, is now the owner.

The field nearer the river, fallow at the time of our visit, bore on the surface some evidence of former occupancy by the aborigines, including a number of arrowpoints of inferior make, the smaller ones among which are barbed.

Partly in the field and in part covered with small pine trees, probably a recent growth, was a low ridge of irregular shape and of undetermined extent, since one end of it seemed to merge with the level of surrounding woods. The highest part of this ridge probably was not more than one foot above the rest of the field.

The soil of which the ridge was composed was loamy sand which extended about 18 inches to undisturbed brown sand.

This ridge evidently had served as a place of burial to a considerable extent, as almost every trial-hole sunk by us came upon human remains, and often the discovery of one burial led to that of another, so that the finding of five or six interments resulted from a single hole.

The two burials which showed no disturbance lay at full length upon the back, but as none of the others encountered by us had been placed more than 6 inches into the underlying brown sand, there had been considerable disar-

rangement of these by contact with the plow. Some of the deeper graves had been disturbed by other graves in aboriginal times.

With the burials was no artifact of any kind, with the exception of eleven vessels of earthenware, some of which were badly broken. The ware from this place is of inferior quality, the shapes are commonplace (pots and bowls), and

Fig. 40.—Vessel of earthenware. Wire Fence Landing. (Diam. 8.1 inches.)

decoration, when present, as a rule is crude. One vessel from this place, more interesting than the rest, is shown in Fig. 40.

Site near Brooks Landing, Bradley County.

About one-half mile southeastwardly from Brooks Landing is a field forming part of a property belonging to Mr. Augustus Turner, who lives on another place a short distance from it. At the northeastern end of the field are two

mounds in sight one from another, one in the field, the other just beyond its limits, in the woods.

The mound in the field has been under cultivation and is greatly spread in consequence. Its height is about 4.5 feet; the diameter of its base, which is roughly circular, is about 90 feet. Trial-holes in this mound came upon compact, yellow clay. No burial or artifact of any kind was met with.

The mound in the woods, about 7.5 feet in height, is of irregular basal outline, its diameter being perhaps about 115 feet. Practically no sign of aboriginal occupancy was noticed in the field.

About one-quarter mile SW. from the field just described is another, a small one belonging to the same owner. In one part of this field was considerable midden débris; the soil was black and had a promising appearance. A human skull was said to have been plowed up at this place. Trial-holes, however, soon came upon underlying yellow clay and no burials were discovered.

Site near Sutton Ferry, Bradley County.

Following the road about one-quarter mile in from Sutton Ferry, on property of Mr. B. H. Ozment, who lives at the ferry but on the side of the river opposite from the field, is cultivated land having in its vicinity a number of small, low, irregular mounds such as are so often found on aboriginal sites in Arkansas and in which burials seldom are discovered.

On the surface of the field was considerable midden débris, which included many arrowheads of flint, mostly rude, some being simply flakes given the outline of projectile points. No burials were found by us in this field, though a place of burial in it or near it most probably was there in the past.

At Sutton Ferry, said to be nine or ten miles by water from the railroad bridge near Warren, Ark., which is the end of navigation on Saline river, our investigation of that stream came to an end, the reports of our agents as to sites to the northward not being of a nature to warrant further search.

A Report on a Collection of Crania and Bones from Sorrel Bayou, Iberville Parish, Louisiana.

By Dr. A. Hrdlička.

Curator, Division of Physical Anthropology, U. S. National Museum.

The collection received in the spring of 1913 from Mr. Clarence B. Moore comprises 17 skulls and parts of one skeleton. Of this material, 16 skulls and a few bones come from a mound on Sorrel Bayou, Iberville Parish, Louisiana, while one skull is from a mound near Wherry Landing in Bradley Co., Arkansas. The latter specimen is a moderately brachycephalic cranium of an adult female, with just a trace of fronto-occipital deformation, and represents a type which was previously described in these reports by the writer and need not here be further considered.[1]

The Sorrel Bayou material was found, according to Mr. Moore, with one exception, in deposits of skulls and bones where the specimens lay in complete confusion. The exception was one skeleton lying in a closely flexed position and on its left side. From this subject it was possible to save a few bones besides the skull.

The 16 crania include 8 males and 8 females, all adults, and ranging between approximately 35 and 60 years of age. They differ in color from pale dirty yellowish white, to obscure black-splotched brown. This is a somewhat remarkable variety of shade from one burial-place, but it can probably be explained by the assumption that the mound was a secondary place of interment and that before transfer the individual subjects lay in soil of different composition. All the specimens are of good consistency and present no fossilization, but also no traces of greenness.

None of the crania present any recent or large wounds, or any disease or pathological deformity. On the contrary they are uncommonly normal and well developed.

The skulls in particular show a good development in size, with strong facial parts and other features, giving the impression that they belonged to people of more than average stature and musculature.

Regrettably, all of the skulls are artificially deformed, presenting more or less marked fronto-occipital compression. This diminishes the value of their measurements and increases the difficulties of their correct anthropological classification. Fortunately, with three or four exceptions, the deformation is moderate enough to permit a visual appreciation of the true type of the specimens.

[1] See this Journal, XIII, 1908, pp. 558–563; XIV, 1909, pp. 173–240; and XIV, 1912, pp. 639–640.

On the whole, it is determinable that the series represents a fairly uniform single strain of people; that this strain was characterized by rather large lower jaws and broad upper dental arches; by a relative fullness of the face, the sub-orbital depressions being but little marked; by a quite pronounced though not extreme prognathism; by large, though at the same time high nasal aperture; and by good sized, megaseme orbits. The supraorbital ridges while strongly developed in the males are not especially heavy, and the forehead, though

Fig. 1a.—The lowest dorsal and upper three lumbar vertebræ of skeleton No. 277,730, U. S. N. M., showing diseased condition and bend forward. Front view.

sloping slightly more backward than in whites, would have shown evidently in no case a decided natural slant.

The vault is as a rule of a very fair height; its outline, seen from above, approaches the ovoid or the elliptical. The cephalic index ranged through mesocephaly, with a few of the forms possibly slightly shorter. The skulls resemble in this and other respects quite closely the crania excavated by Mr. Clarence B. Moore on a former occasion at Johnson Place, Avoyelles Parish, La. (though those were not deformed), and also a certain proportion of the crania collected by Mr. Moore and others in southern Arkansas. They are remarkably like the less narrow type of crania among the Siouan people and the more southern

Iroquois. To the southwestward, they are related to the few undeformed crania that we now know from the Port Arthur region and from Galveston.

The above suggestions are about all that can at present be ventured with some safety. The anthropologist works under great difficulties in these regions, on one hand on account of the head deformations, and on the other because of lack of well-identified comparative material from such tribes as the Choctaw and their neighbors on one side, the Chitimacha and Atakapa on the other and the

FIG. 1b.—The lowest dorsal and upper three lumbar vertebræ of skeleton No. 277,730, U. S. N. M., showing diseased condition and bend forward. Side view.

Natchez people to the north. However, if collections such as those of Mr. Moore continue to be made we shall a few years hence be in a position to give a more definite account of the nature of the remains from these territories than is now possible.

Special Remarks: With the exception of a few insignificant impressions due to old knocks, occasional traces of arthritis in the glenoid fossa and on the

condyloid process of the lower jaw, and three instances of exostoses in the distal part of the auditory meatus,[1] the 16 crania show nothing pathological. Even the teeth, though in some cases showing advanced wear, are uncommonly healthy, out of the 401 teeth present only six (in five skulls) presenting slight to moderate caries.[2] In three or four instances there evidently existed, however, some pyorrhoea.

As to anomalies, there are none worthy of special mention; two of the male skulls are however very heavy, one with its lower jaw reaching the weight of fully three pounds. Two of the lower jaws, though otherwise normal, are of extraordinary size even for the Indian.

Opposed to the very healthy state of the skulls, the bones of the skeleton of No. 277,730 show considerable disease. They present what is either tuberculosis or a very pronounced form of arthritis, of the lowest dorsal and especially the upper lumbar vertebræ—with moderate curvature forward of the spine at this place (Figs. 1a, 2a); an abscess cavity in the distal end of the left clavicle; more or less marked traces of periostitis on all of the long bones as well as both of the clavicles; and signs of arthritis on one of the condyles of the right femur, as well as the lower articular surface of the right (the left absent) humerus. These bones represent one of the two skeletons in the mound whose parts were found in association and may belong to an intrusive, later burial.

[1] In two males quite marked bilateral, in one male slight unilateral.

[2] Of those absent all but 15 were lost post-mortem; and 13 of these 15 were lost in life by one of the women.

ABSTRACT OF MEASUREMENTS.

Crania.	Males.			Females.		
	Average, cm.	Minimum, cm.	Maximum, cm.	Average, cm.	Minimum, cm.	Maximum, cm.
Cranial capacity (author's method)	*1584 c.c.*	1430 c.c.	1740 c.c.	*1338 c.c.*	1230 c.c.	1445 c.c.
Mean cranial diameter (cranial module) $\left(\frac{\text{length} + \text{breadth} + \text{basion-bg. height}}{3}\right)$	*16.20*	15.30	16.47	*14.92*	14.43	15.40
Thickness of skull (along and 1 cm. above squamous sut.)	*6 mm.*	4–7	6–8	*6 mm.*	4–6	6–8
(a) Total height of face (menton-nasion)	*13.2*	11.8	14.2	*11.3*	10.9	11.7
(b) Upper height of face (alveolar point-nasion)	*7.9*	7.2	8.5	*7.1*	6.3	7.9
(c) Diameter bizygomatic max	*14.9*	13.5	15.4	*13.4*	12.9	14.3
Facial index, total $\left(\frac{a \times 100}{c}\right)$	*88.5*			*85.5*		
Facial index, upper $\left(\frac{b \times 100}{c}\right)$	*53.2*			*52.6*		
Index of facial prognathism (angle between lines basion-alveolar point and alveolar point-nasion)	*71°*			*71.5°*		
Index of alveolar prognathism (angle between lines basion-alveolar point and alveolar point-subnasal point)	*56°*			*55°*		
Orbits: Mean height	*3.66*	3.5	3.85	*3.57*	3.25	3.8
Mean breadth	*4.07*	3.8	4.35	*3.84*	3.55	4.05
Mean index	*90.*			*93.*		
Nasal aperture: Height	*5.6*	5.15	5.85	*5.1*	4.5	5.6
Breadth	*2.8*	2.55	3.3	*2.6*	2.1	2.9
Index	*50.4*			*50.4*		
Lower jaw: Height of symphysis	*4.*	3.5	4.4	*3.2*	2.9	3.4
Thickness at 2d molar	*1.75*	1.55	2.	*1.6*	1.35	1.8
Diameter bigonial	*11.*	9.7	12.2	*10.1*	9.6	10.5
Angle	*114°*	104°	125°	*122°*	116°	129°
Circumference, greatest horizontal	*51.6*	49.3	53.2	*48.7*	47.0	50.3
Sagittal arc (nasion-opisthion)	*36.9*	35.5	38.1	*35.*	34.1	36.3
Nasion-bregma segment	*12.8*			*12.*		
Bregma-lambda segment	*12.1*			*12.*		
Lambda-opisthion segment	*12.0*			*11.*		

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Evolution of the Color Pattern in the Microlepidopterous Genus Lithocolletis

BY

ANNETTE FRANCES BRAUN

PHILADELPHIA

1914

EVOLUTION OF THE COLOR PATTERN IN THE MICROLEPIDOPTEROUS GENUS LITHOCOLLETIS.

By Annette Frances Braun.

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I. INTRODUCTION.

The interest in a study of the origin of the many and complex forms of color pattern in insects lies mainly in the hope that such a study may give additional insight into the fundamental principles of evolution in general. With few exceptions, such as the work of Tower on *Leptinotarsa*, researches of this nature have been confined to the Macrolepidoptera, chiefly to the butterflies and higher moths. The Microlepidoptera, which are less advanced from the viewpoint of evolution, have been almost neglected. Yet, within this group, several of the older and larger genera afford excellent and ample material for such an investigation. To secure convincing data, a critical study, both ontogenetic and phylogenetic, must be made of the species of a large genus, in which the color patterns, while sufficiently diverse to indicate that a considerable degree of evolution has taken place, are still comparatively simple.

The genus *Lithocolletis* fulfills to an extraordinary extent these requirements; hence the following investigations were undertaken with the object of ascertaining the modes of origin of the various color patterns in this genus and the influences which have been operative in their evolution. The study of adult color patterns has extended over a period of several years; the observations on pupal development were made during the summer of 1910.

It is a pleasure to express to Prof. M. F. Guyer my appreciation of his many helpful suggestions during the progress of my work.

II. METHODS AND OBSERVATIONS.

(*a*) Systematic Position and Characteristics of Lithocolletis.

The genus *Lithocolletis* belongs to the large family Tineidæ of the Microlepidoptera. It comprises a large number of very small moths, varying in expanse from 4 to 12 millimeters. The larvæ are exclusively miners, usually in leaves or very rarely in the bark of stems. The entire larval and pupal existence with one or two exceptions is passed within the mine. The genus, as originally established, has a remarkably uniform structure and a very characteristic appearance, enabling one to recognize the species easily. The structural characteristics which distinguish the typical and principal group are the following:

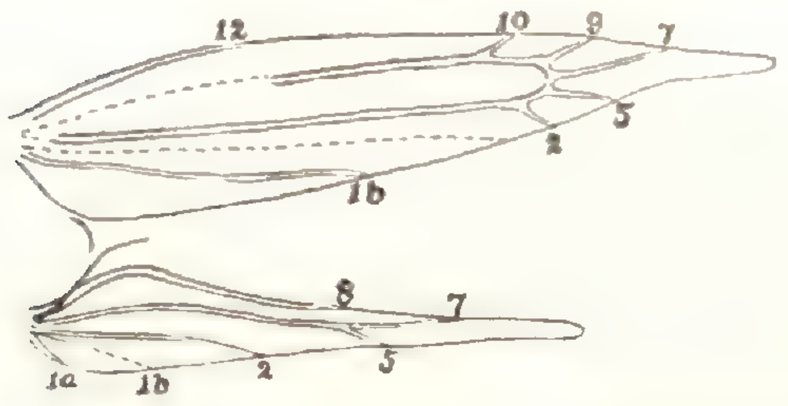
Fig. 1. Venation of *Lithocolletis*.

Face smooth; crown tufted; labial palpi porrected or drooping, moderately long and pointed; maxillary palpi rudimentary; tongue of moderate length; antennæ nearly attaining the wing length, simple in the male, basal joint thickened and bearing a pecten. The forewings are elongate, lanceolate, acuminate. The hindwings are about one-halfthe breadth of the forewings, linear lanceolate and fringed with cilia whose length is from four to five times the breadth of the wings. The venation is illustrated by *Fig. 1*;[1] forewings, 1*b* simple, 3 absent, 4 absent, 6 absent, 7 to costa, 8 absent, 11 absent; hindwings, 3 absent, 4 absent, transverse vein absent between 2 and 5, 6 absent. The posterior tibiæ bear appressed hairs.

All of the European species and the great majority of the American species conform to the above conception of the genus. There are, however, in North America a few species belonging to two different groups, which differ structurally from the typical species; for these, two subgenera, *Porphyrosela* and *Cremastobombycia* have been erected (Braun, '08). The former of these, *Porphyrosela*, differs from *Lithocolletis* in the absence of vein 10 of the forewings, the absence of a pecten on the first joint of the antennæ and in the absence of hairs on the hind tibiæ.[2] It thus represents a later development, phylogenetically, in the direction usually taken in this family; that is, a reduction in the number of veins (*Fig. 2*). *Cremastobombycia* is of a more ancestral type than the typical *Lithocolletis;* it possesses an additional vein in each wing; on the forewing, vein 4 is present and stalked with 5; on the hindwing, vein 6 is present and long stalked with 5 (*Fig. 3*).

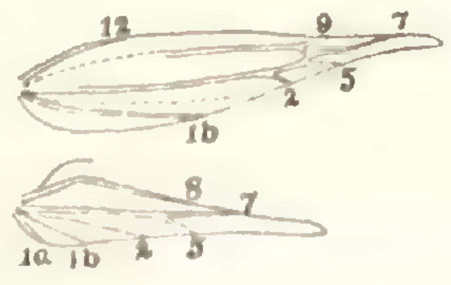
Fig. 2. Venation of *Porphyrosela*.

In the European fauna, the typical Lithocolletids are a very homogeneous group of species both as regards larval characteristics and imaginal markings.

[1] References in italics are to the text figures, those in Roman type to the figures on the plates.

[2] Since this paper was written, studies on very closely allied species have shown that these characters are not sufficiently constant to define a genus (Meyrick, Genera Insectorum, 128me Fascicule, p. 5, 1912). Vein 10 is probably faintly visible in large specimens of *L. desmodiella*.

In all, the larva is of the so-called cylindrical type, which agrees well with the usual type of lepidopterous larva. During the first three instars, in which the extent of the mine is gradually increased by a loosening of one epidermis, the larva has a characteristically flattened shape, with flat head and projecting mouth-parts. After the third moult, the larva assumes the normal cylindrical shape and the mine becomes tent-like by a fold in the loosened epidermis. The larva then consumes the greater part of the parenchyma within the area occupied by the mine. The pupa, except that of one species, is always formed within the mine and may or may not be enclosed in a cocoon. The forewings of the imagoes are marked by various combinations of white transverse fasciæ and streaks on a yellowish ground color. These white marks are bordered along their inner edges by dark brown or blackish scales; sometimes, but to a less extent, dark scales may also appear along their outer edges. The hindwings are unicolorous.

FIG. 3. Venation of *Cremastobombycia*.

Our American species while conforming in all structural characteristics to those of Europe, fall naturally into two groups; one of these agrees closely in structure of larva and imaginal markings with the European type just described; the other has what has been termed the "flat larva," and the imagoes produced from such larvæ can always be sharply distinguished by their markings from the species of the "cylindrical-larval group." The "flat larva" retains the flat shape, which is characteristic of the first three instars of the "cylindrical-larval group," through the fourth, fifth and sixth instars, only assuming the cylindrical shape and an approach to normal mouth-parts with the last moult. By some systematists, the persistence through three additional larval instars of the curious modification of the mouth-parts, which is in fact an adaptation for loosening the epidermis, has been regarded as a sufficient ground for the generic separation of this group, and the name *Cameraria* Chapman has been applied to it (Chapman, '02). The other view, which regards the modification of the mouth-parts merely as an adaptation for a particular mode of life, and not a character indicating the natural separation of that group from one with which the imagoes agree in all structural details, has been presented in the *Canadian Entomologist* for December, 1909 (Braun, '09).

The mines of the "flat-larval group" are always found upon the upper side of the leaf. The increase in the extent of the mine continues through six instars, the larva consuming only a few layers of cells in front of it. For this reason, the parenchyma within the mine is never entirely consumed and the mine rendered semitransparent, as is the case in mines of the "cylindrical-larval group." During the seventh instar, the larva does not feed; the time is occupied in preparation for the pupal state. Where the imago is to emerge the same summer, most of the species spin cocoons. The cocoon is a flat, oval sheet of silk attached around its edge to the floor of the mine, the epidermis above being

thrown into a fold. In the overwintering generation, the larvæ hibernate, changing to pupæ in spring without spinning cocoons. The characteristic which distinguishes the imagoes of this group from the usual type is that the dark scales appear on the outer edges of the white streaks and fasciæ; if a margin is present on an inner edge, it is much less pronounced.

The wide geographical range and the large number of species would lead to the inference that the genus is an old one. If so, we would expect to find some species which have halted at an early stage in their evolution and have therefore preserved a color pattern which should bear some resemblance to the primitive one and hence afford a clue to it. Others would have advanced farther, development ceasing at different levels, so that the numerous differentiations produced should constitute a chain of related species, broken no doubt by numerous gaps but still sufficiently complete to indicate the different directions which evolution has taken. The problem of this research is, then, to determine what is the primitive color pattern of this group and knowing it to trace the paths along which evolution has proceeded in the production of the respective patterns of the numerous species now in existence. It is scarcely probable that the primitive pattern is preserved among any of the earlier genera from which *Lithocolletis* is descended. Such a long period of time has elapsed since the origin of *Lithocolletis* that the species now belonging to ancestral genera have probably deviated widely from the type of marking then characteristic of them. This view is rendered more plausible by the fact that the subgenus *Cremastobombycia*, which possesses structural generic characters which suggest it as the immediate ancestor of *Lithocolletis,* has a type of marking differing considerably from that common to the large and widely distributed typical group and resembling, to a marked degree, the type of marking characteristic of some of the species of the smaller and seemingly younger group, usually known as the "flat-larval group." If so, we should search for the primitive color pattern among the less differentiated species of the typical group of *Lithocolletis.*

If evolution takes place in several definite directions irrespective of utility, as contended by Eimer, this group should offer an opportunity of testing this theory, within certain limits, since many of the highly specialized differentiations, indicating a high phylogenetic development and requiring a long time to perfect, are of almost microscopic proportions and of no conceivable value in the life of the organism. Hence it is improbable that natural selection would have stepped in to mar any results which might have been produced through orthogenesis.

In a genus such as this, where the color combinations are relatively simple and the limits of the marks clearly defined and the pigmental colors belong to the single series of yellows (or reddish yellows), browns and blacks, the problem of tracing their differentiation both ontogenetically and phylogenetically should be one less complicated than in higher groups, and the observations should offer more direct testimony as to the means by which such results are obtained.

(*b*). COLOR CLASSES REPRESENTED AND STRUCTURE OF SCALES.

Tower ('06) has given a comprehensive survey of the literature dealing with the production of color in insects. Merely a brief summary of the salient facts bearing on the subject of this research is given below, and the reader is referred to the researches of Tower and earlier investigators for a complete statement of what has been accomplished along this line. This author has divided the colors of insects into three main classes, based upon their means of production. These are chemical or pigmental, physical or structural and chemico-physical or combination colors. Pigmental colors are further subdivided into three groups: cuticula or dermal, hypodermal and subhypodermal colors. The pigments through whose agency colors in the scales of Lepidoptera are produced are largely hypodermal; though there is a possibility that certain browns and blacks, which are very permanent under the influence of reagents, are cuticula colors and therefore located in the walls of the scales, instead of being present as granules within the scales. White is probably the only purely physical color in insects, although various other colors may be produced through the agency of physical causes acting in combination with pigments. The latter, the chemico-physical colors, are the most widely distributed and are due to the action of light falling upon a surface of different structural modifications over a layer of pigment. The various lustrous, metallic and iridescent colors of scales of Lepidoptera are due to this cause.

In the group under consideration, the lustrous white of the streaks and fasciæ is produced entirely through structural agencies. The scales over these areas, when tested by the addition of alcohol, cedar oil or other similar reagents—a method originated by Dimmock ('83),—are rendered transparent and colorless, proving that these scales are hollow and contain no pigment. The shining golden yellows, browns, black and iridescent blues are combination colors. When viewed by transmitted light, the scales reflecting the first three of these colors remain essentially the same color; the iridescent blue scales appear to contain a pale brown pigment; hence the blue is entirely due to physical causes.

The scales in the majority of the species have a remarkably uniform structure and shape, although showing great variation in size and in the proportion of length to breadth. In any one of the typical species, *L. lucidicostella* or *cratægella* for example, the scales are wedge-shaped, tapering more or less rapidly to the short stem by which they are inserted into the wing. The outer edge of the scale is dentate, the number of teeth varying from two or three in the elongate scales around the apex of the wing in the cilia to seven or eight in the broader and shorter scales lying over the wing membrane. In some of the scales, the teeth are approximately equal; in others, they are of uneven sizes, and a small tooth is sometimes inserted between two larger ones. Variations in the shape of scales over the main part of the wing are illustrated by *Fig. 4*. The last row of scales projecting from the apex of the wing over the cilia is composed of

exceedingly elongate, linear scales, so that toward their bases they appear almost as fine as the cilia themselves. Such a scale, one of the blue iridescent scales in the cilia of *L. cratægella,* is illustrated by *Fig. 5.* The scales forming the apical spot, a characteristic of a considerable group of species, are smaller than the average and proportionately broader and are of almost uniform size. The scales in the black patch before the apex of such species as *L. cratægella* are very similar to these.

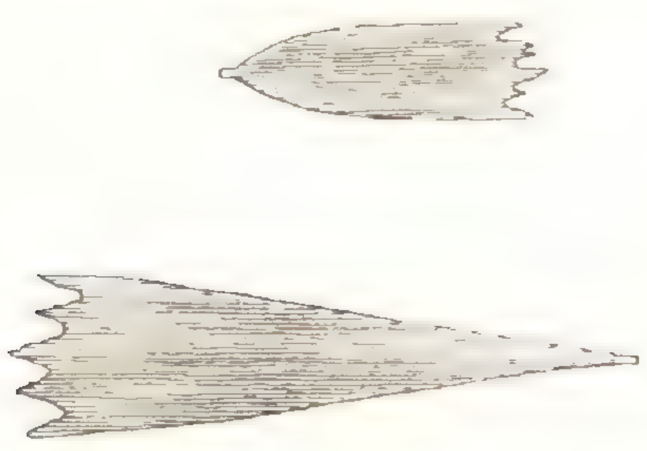

FIG. 4. Wing scales.

All of the scales just described are marked with a series of nearly parallel striæ, there being six or eight such ridges extending into each tooth.

In a few species, which for additional reasons to be adduced later are to be regarded as among the farthest advanced phylogenetically, a peculiar highly specialized type of scale has developed. The extremely brilliant luster of the white markings of *L. morrisella* and *ostensackenella* and *P. desmodiella* and of the bronzy purple metallic reflections on the thorax and base of the wings of *P. desmodiella* is produced by these scales. These white scales, one of which is illustrated by *Fig. 6,* are broader than the usual type, and the sides curve outward from the base. The outer edge of the scale, instead of being coarsely and acutely dentate as in the ordinary scales, is obtusely dentate or, sometimes, the teeth are entirely absent. The edge then appears scalloped, in a manner similar to the edge of a pecten. The depressions between the striæ, which appear rather broader and more widely separated than usual, are concave. The concavities between these striæ appear as if formed by a sloping out of the sides of the striæ. The assumption of a concave surface will explain the brilliant and slightly opalescent luster of these scales; the various colors being produced by essentially the same processes as they are in a soap film. These scales contain no pigment whatever; the effects observed are due entirely to the effect of light passing through a medium of varying thickness. It may be noted here that in *L. robiniella,* a species very closely related to *L. morrisella,* this differentiation has not reached the same degree of perfection. The white scales are, however, broader and with fewer striæ than those of the more typical species. The metallic purple scales of the base of the wings and thorax of *P. desmodiella* are very similar to the white scales structurally but differ in that they contain a brownish pigment. Their metallic iridescence may undoubtedly be ascribed to the same agencies.

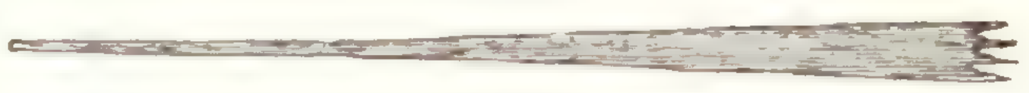

FIG. 5. Apical wing scale.

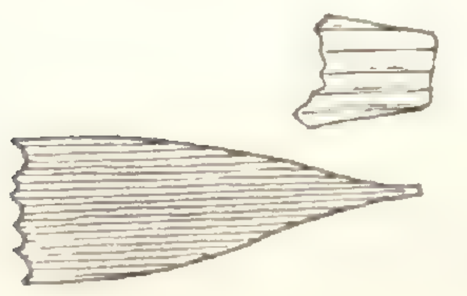

FIG. 6. White wing scale of *L. morrisella.*

(c) Comparative Study of the Adult Markings.

The following study of the adult markings was instituted for the purpose of discovering whether, as was suggested earlier in the paper, the primitive

color pattern of the genus, or an approach to it, still exists among the modern species. The presence, in several species, of a number of almost straight or slightly modified transverse bands, separated from one another by unpigmented fasciæ, suggested the possibility that such a transversely banded arrangement of pigment areas, alternating with unpigmented fasciæ, was the primitive color pattern of the genus. This idea received some support from the fact that in *L. tiliacella*, whose pattern will be described in detail below, the bands in the apex of the wing are uniformly pale yellow, with no trace of darker scales. Bearing in mind the generally accepted fact that, phylogenetically, pale yellow is one of the oldest pigmental colors, some portions of the wing of *L. tiliacella* are probably still in the ancestral condition. In this species, seven distinct color areas can be made out, most of which are completely separated from one another by white (unpigmented) areas which lie over the origins or the tips of the nervures. As no species has been found to have a greater number of separate pigmented areas, and most of those which do not show a banded type of marking have fewer such areas, the conclusion was reached from the study of the adult markings that *the primitive color pattern consists of a series of seven transverse bands, separated from one another by unpigmented areas.*

The verification of this conclusion rests upon the studies of pupal development of the color pattern, which have also shown how the modifications in the color pattern, characterizing the different groups described below, have been brought about.

The evidence for the above conclusion as to the primitive color pattern, in so far as it is based upon adult characters, is given below. In this relatively brief survey of the adult markings of the numerous species comprising the genus *Lithocolletis* and its subgenera, the writer has been guided in the grouping of the species, as far as practicable at this stage of the presentation of the results of the research, by affinities determined through the discovery of the action of certain definite laws in bringing about changes in the shape and extent of the color areas. Occasionally, it has been found convenient to bring in arbitrary distinctions, used to separate the species systematically. This is true in the second group of species discussed; here the presence of a median fascia, while doubtless a character valuable to the taxonomist, is in no way an indication that the species are closely related to one another. Evolution has proceeded along the same line in the different species in respect to this one characteristic alone; the differentiation of the other markings has been brought about in such different ways as to indicate the early branching of this stem of the phylogenetic tree.

In the discussion of the individual species, the characters referred to are those developed through the action of general evolutionary tendencies. The various levels which such development has reached before coming to a standstill, mark the points where the different subgroups of species diverge from the main stems. Within these subgroups, there have been numerous differentiations, producing the actual species we now know. Such specific differences must be

minor ones, since the general plan of coloration has been already determined. Where a group of species has branched early from the main stem, the individual species within it will be found to be less closely related; the longer period of time allowed for differentiation within the group has given opportunity for greater divergence of the individuals composing it.

In general, no effort has been made to discuss the minute characters separating the species. Such characters and their processes of differentiation are more properly discussed later.

Leaving out of consideration for the present the species of the subgenera *Porphyrosela* and *Cremastobombycia*, the main branch of the genus may be divided, as has been mentioned earlier in this paper, into two natural divisions, sufficiently distinguished from one another by the type of larva and by the position with respect to the white fasciæ and streaks of the dark scales bordering them.

In the division whose larva in the later stages is of the normal cylindrical type, when a dark margin occurs on but one side of a white mark, it is present on the internal edge. In the majority of the species, this margin is the only one present; in some species, however, external margins have developed adjacent to some or all of the streaks. The external margin is, as a rule, considerably paler and less complete than the internal one; in a few cases, where both are equally well developed, other characteristics will leave no doubt of the division to which any species belongs. For convenience of reference, this division has been designated Division I. The species are illustrated on Plate III.

Several well-defined groups are recognizable. Some of these include a considerable number of species, showing close intergradations and indicating their origin from a common ancestor at a no very remote period. Other species seem to stand apart, showing no very clear affinities with any of the existing species.

One group, comprising *L. tiliacella* (Fig. 1, Pl. III; Text *Fig. 7*), *oregonensis*,[1] *affinis*,[1] *tritænianella* (Fig. 5), *ostensackenella* (Fig. 7) and *mariæella* (Fig. 8) as typical forms, and *fragilella* (Fig. 3) and *celtifoliella* (Fig. 4) as extreme deviations from the typical, is characterized by the presence of at least two complete white transverse fasciæ, the first crossing the wing at about the basal fourth, the second near the middle.

Fig. 7. Forewing of *L. tiliacella*.

In *tiliacella* (*Fig. 7*), the ground color is a very pale golden; a spot at the base of the dorsal margin is white; the two fasciæ are almost straight, the first but faintly dark margined. At three-fourths of the wing length, there are two white dark-margined spots, corresponding in position to a third fascia, very narrowly separated by pale golden scales which unite with a pale band of the ground color beyond. Then follows a fourth white fascia, separated from the apex of the wing by a few pale golden scales which mark the position of a band

[1] It was impossible to obtain figures of *L. oregonensis*, *affinis*, *occitanica* and *alni*.

of the ground color. Sometimes the apex of the wing is pure white; sometimes the extreme tip has a few golden scales. There are thus six white spots (four of these are the extremities of fasciæ) along the dorsal margin and five on the costal margin, separated from one another by ground color. These correspond in position with the points of origin or with the tips of the nervures. The positions of the white spots with respect to the nervures are as follows: the white streak at the base extends somewhat obliquely, lying over the point of origin of the tubular part of the upper median vein; the first fascia lies proximally over the tip of vein 12, distally over the origin of the tubular part of the upper median vein; the second fascia on the dorsal margin lies over the tip of vein 1*b*; the pair of white spots at three-fourths lie over the tips of veins 10 and 2 respectively; the white fascia beyond, over 9 and 5; the last white fascia lies over vein 7 on the costa. These white unpigmented areas are the interspaces between bands of ground color, seven in number, of which the first two are united on the costa.

In *L. oregonensis*, the same number of white interspaces are present with the exception of the white spot at the base of the dorsum, but the fasciæ are more bent. The ground color is a deeper golden, and, whereas in *tiliacella* the fasciæ beyond vein 10 are represented by a few pale yellow scales only, the ground color is distinct, and the fourth fascia is black margined. The extreme apex of the wing, which in *tiliacella* showed only a faint tinge of golden, contains a black apical spot. In *affinis*, *tritænianella* (Fig. 5), *ostensackenella* (Fig. 7) and *mariæella* (Fig. 8) there is a reduction in the number of white fasciæ and spots; the spots over veins 9 and 5 are wanting, and the ground color extends uninterruptedly from vein 10 to vein 7. In *ostensackenella*, the white streak enclosing the apex has become divided into a pair of opposite spots; the base of the wing is dark brown. In *affinis* and *tritænianella*, the white streak before the apex does not extend entirely across the wing. In *tritænianella*, the first white fascia is situated before the tip of vein 12. As it occupies the same position with respect to the origin of the upper median vein as the corresponding fascia in *tiliacella* (*Fig.* 7), it would seem that the origin of this vein is the factor determining the position of the first fascia. This conclusion is corroborated by identical observations on other species.

L. fragilella (Fig. 3) and *L. celtifoliella* (Fig. 4) are not closely related to the preceding members nor to one another. In both, the fasciæ are densely dusted internally with dark-tipped scales; in *fragilella*, the fasciæ are suffused with pale yellow; in *celtifoliella*, the fasciæ are acutely angled, and the oblique costal and dorsal arms reach the margins proximal to their usual position. As will be seen later, this displacement of the extremities of the first two fasciæ proximally is of common occurrence and has been one of the principal forces in the evolution of the species of this genus.

Desmodiella (Fig. 9), the single representative of the subgenus *Porphyrosela*, which structurally is in advance of *Lithocolletis*, has retained the banded

type of marking. There are two lustrous white fasciæ, dark margined on both sides, on a dark reddish brown ground color, showing a deep purple metallic luster at the base of the wing.

In another group of species, the median fascia only has been preserved, either in its primitive almost straight condition or has become angulated. Most of the species bear no close relationship to one another, and it would seem, therefore, that the group is merely an artificial one and that the characteristic of a median fascia is one which appears in several divergent lines of development. The species which may be included in this group for purposes of discussion are the following: *L. morrisella* (Fig. 48), *uhlerella* (Fig. 49), *lucetiella* (Fig. 51), *symphoricarpella* (Fig. 54), *gemmea* (Fig. 53), *martiella* (Fig. 52), *celtisella* (Fig. 56) and *apicinigrella* (Figs. 55*a*, 55*b*). *Robiniella* (Fig. 50) shows a very clear natural relationship with the first two mentioned species, and differs from them only by the separation of the median fascia into a pair of opposite costal and dorsal streaks,[1] and the obliteration of the first dorsal streak by dark scales.

Morrisella (Fig. 48,), *uhlerella* (Fig. 49) and *robiniella* (Fig. 50) are a remarkably homogeneous triad of species; the figures will suffice to give a clear idea of their characteristics. In *lucetiella* (Fig. 51), the entire basal half of the wing is white, with the exception of a longitudinal streak from the base following the course of the upper median vein; the apical half of the wing closely resembles that of *tiliacella* (*Fig. 7*). In *symphoricarpella* (Fig. 54), the basal half of the wing is of the golden brown ground color; the white streaks over veins 9 and 5 are lacking. In *martiella* (Fig. 52) and *gemmea* (Fig. 53), there is a white basal streak;[2] in *gemmea* a white spot on the dorsal margin occupies a position nearly corresponding to the extremity of the first fascia. In these two species, as in *morrisella, uhlerella* and *robiniella,* a group of small scales in the apex forms the black apical dot. *Celtisella* (Fig. 56) and *apicinigrella* (Figs. 55*a*, 55*b*) are characterized by the presence of an acutely angled fascia and a median white basal streak. In *celtisella,* the dorsal margin is also white from the base to the fascia. *Apicinigrella* is an extremely variable species; sometimes the fascia is broken in the middle; an extreme aberrational form is represented by Fig. 55*b*.

Basistrigella (Fig. 57), although a somewhat isolated species, is perhaps most closely related to *celtisella* (Fig. 56) and *apicinigrella* (Figs. 55*a*, 55*b*) of the above group. The median pair of streaks are of equal width throughout and each is extended at its extremity along the margin to the base.

Bataviella (Fig. 58) stands entirely apart from any of the species of the American fauna; there are, however, several closely related species in the European fauna. The white spot which was present at the base of the dorsal margin in *tiliacella* and did not reach the costa, is here often extended entirely

[1] The terms "costal streak" and "dorsal streak" are used to designate the white and usually triangular spots situated on the costa and dorsum respectively.

[2] The "basal streak" is the white longitudinal line beginning at the base of the dorsum and extending along the middle of the wing for about one-third its length.

across the wing thus separating a basal patch of dark scales from the band of similar scales beyond it. In this species, therefore, the number of distinct patches or bands distinguishable along the costa is seven, separated more or less completely from one another by white interspaces.

The remainder of the species, and by far the most numerous, have been included in one large group, because all can be traced to a common origin and all are manifestations of a similar tendency in development. All are characterized by the presence of pairs of opposite curved, oblique costal and dorsal streaks, widest on the margins and tapering in the middle of the wing to pointed apices. There are a number of well-defined subgroups, due to the halting of individuals at different stages in the general process of evolution and the differentiation of a number of species from each of these.

Standing at the foot of the group and somewhat apart from the other species, is *auronitens* (Fig. 10). In it, there are three dorsal streaks before the tornus,[1] but little oblique and not displaced proximally from their normal position with respect to the nervures.

Argentinotella (Fig. 11), *occitanica* and *leucothorax* (Fig. 13) are also characterized by the presence of three streaks on the dorsum before the tornus. These are decidedly oblique, especially in *leucothorax*, in which there is also a well-defined apical spot. In *occitanica*, the first, fourth and fifth costal streaks present in *argentinotella* are wanting.

In *fitchella* (Fig. 14), there are but two dorsal streaks before the tornus; the first is unusually large, suggesting from its position the possibility of its formation from two white streaks. That this has occurred and the processes bringing it about will be discussed later.

Salicifoliella (Fig. 15) and *tremuloidiella* (Fig. 16) are not closely related to any of the large subgroup of species soon to be discussed. These two isolated species are the result of differentiation and advancement along other lines, when there has been a cessation, at a lower level, of the common course of evolution, which if continued, culminates in such forms as *hageni* (Fig. 17) and later, in the large subgroup of species of which *cratægella* (Fig. 36) and *obscuricostella* (Fig. 25) are typical representatives. Because of this, their markings will be better understood when the laws governing their transformation have become apparent.

Insignis (Fig. 20), *hageni* (Fig. 17) and *arbutusella* (Fig. 18) are properly grouped together. In another variety of *insignis*, the white extends from the basal streak across the wing to the dorsum, forming a quadrate white patch similar to that of *hageni*. These three species are likewise differentiations from an offshoot of the main stem, although at a higher level than the two preceding species.

We now come to the large subgroup of species characterized by two oblique

[1] The three margins of the wing are the costa or upper margin, the termen or outer margin and the dorsum or inner margin. The junction of the costa and termen is the apex of the wing; the junction of the termen and dorsum is the tornus. In this group, where there is no defined termen, the tornus is the place where the line of scales in the cilia meets the dorsal margin.

streaks on the dorsum, the first usually very oblique, the second, which is placed at the tornus, often nearly perpendicular, and four costal streaks (rarely five as in *populiella* and *rileyella*). These are *populiella* (Fig. 27), *diaphanella* (Fig. 28), *salicivorella* (Fig. 29), *deceptusella* (Fig. 30), *alnicolella* (Fig. 32), *alni, incanella* (Fig. 34), *scudderella* (Fig. 35), *ledella* (Fig. 33), *malimalifoliella* (Fig. 37), *cratægella* (Fig. 36) and *propinquinella* (Fig. 38), in which the black scales in the apex are not massed to form a circular apical dot; and *caryæalbella* (Fig. 21), *rileyella* (Fig. 22), *ostryæfoliella* (Fig. 23), *olivæformis* (Fig. 24), *obscuricostella* (Fig. 25), *kearfottella* (Fig. 26), *obsoleta* (Fig. 41), *sexnotella* (Fig. 39) and *æriferella* (Fig. 40), in which a number of small black scales in the apex are grouped into an almost circular, definitely outlined, apical spot. In *obsoleta* (Fig. 41), this spot is very ill-defined, as are all the other markings. With the exception of the three last mentioned species, a white median basal streak extends to about one-third of the wing length. This streak may be margined above and sometimes around its tip with dark scales. In some of the species, there is, on the dorsal margin, a small white spot, often extended almost to the base of the wing and with its outer edge about midway between the base of the wing and the first dorsal streak. In a few cases (*e. g., incanella* (Fig. 34)), this spot is indistinctly margined on its inner side by a short oblique line of darker scales. In *obsoleta* (Fig. 41), *sexnotella* (Fig. 39) and *æriferella* (Fig. 40), the entire basal portion of the wing is without markings, the ground color extending uniformly over it.

Lastly, there is that subgroup of species in which there is but one margined dorsal streak and that one is situated at the tornus; the basal portion of the wing is, to a great extent, shining white, and any colored markings present are longitudinal. These are *trinotella* (Fig. 47), *quercialbella* (Fig. 46), *clemensella* (Fig. 45), *lucidicostella* (Fig. 44) and *argentifimbriella* (Fig. 43). Phylogenetically considered, *albanotella* (Fig. 42) should be included here, as representing an earlier stage in the process resulting in the production of these five species. In this species, a first dorsal streak is defined by an incomplete margin not reaching the dorsum.

In Division II of the genus, illustrated on Plate IV, where the modified flat type of larva persists through six larval instars, the chief aggregation of dark scales is on the outer side of the white streaks and fasciæ. Where an additional margin occurs on the inner side of the white markings, the outer one has broadened considerably and is often prolonged at the angle of a fascia as a dense aggregation of dark tipped scales. There seems to be less tendency in this group toward the concentration of dark scales in the apex over a definitely outlined area; the tendency is rather for all the scales to become dark tipped, producing an evenly dusted effect. As in Division I, several groups of species are recognizable.

In one group, there is a tendency to preserve, either straight or angulated, two white fasciæ, the first crossing the wing at the basal fourth, the second at the middle. In *obstrictella* (Fig. 64), these fasciæ are almost perpendicular and straight; the pair of white streaks beyond often form a third fascia. In

tubiferella (Fig. 65), *aceriella* (Fig. 66) and *hamameliella* (Fig. 67), these fasciæ are straight and but little oblique. In *tubiferella* (Fig. 65), they are the only white markings, except sometimes a very small white dot near the apex. In *aceriella* (Fig. 66) and *hamameliella* (Fig. 67), there are, in addition, an oblique white streak at the base of the dorsum, a longer oblique dorsal streak at the tornus and a small white streak opposite it on the costa. *Ostryarella* (Fig. 68), *corylisella* (Fig. 69), *æsculisella* (Fig. 70) and *guttifinitella* (Fig. 71) constitute a closely related series, separated from one another by small differentiations. In these species, the two fasciæ are bent outwardly below the costa, scarcely enough to be called angulated. In *guttifinitella*, the pale streak at the base of the dorsum is almost or sometimes entirely wanting. In *lentella* (Fig. 73) and *caryæfoliella* (Fig. 72), the fasciæ are distinctly angulated.

In *cincinnatiella* (Fig. 75), *macrocarpella* (Fig. 74), *saccharella* (Fig. 76), *hamadryadella* (Fig. 77), *umbellulariæ* (Fig. 78) and *agrifoliella* (Fig. 79), at least one of the two white fasciæ has become acutely angulated. In *hamadryadella* (Fig. 77) and *umbellulariæ* (Fig. 78), the white fascia at the base is preserved to the costa, although in *umbellulariæ*, it is almost separated into two parts. In *agrifoliella* (Fig. 79), the position of this fascia is indicated by two patches of dark scales which would form its external margin. In *hamadryadella* (Fig. 77), very complete internal margins to the white fasciæ have developed; the ground color has, however, shrunk away toward the base, so that the line of dark scales extends through the middle of a broad white band. In *cincinnatiella* (Fig. 75) and *macrocarpella* (Fig. 74), the two fasciæ are uniformly angulated; the white patch at the base does not reach the costa. The costal arm of the first fascia of *saccharella* (Fig. 76) is wanting, its dorsal arm is very oblique and confluent with the oblique basal streak.

A group of species comprising *fletcherella* (Fig. 80), *arcuella* (Fig. 81), *betulivora* (Fig. 82), *australisella* (Fig. 83), *bethunella* (Fig. 84), *chambersella* (Fig. 85), *cervina* (Fig. 86), *platanoidiella* (Fig. 87), *castaneæella* (Fig. 88) and *fasciella* (Fig. 89) retains but the single median fascia, sometimes almost divided at its angle. A pair of opposite oblique streaks represent the former complete fascia at the basal fourth of the wing in the five first mentioned species of this group; in the remaining five, the costal streak only is present. In *castaneæella* (Fig. 88) and *fasciella* (Fig. 89), there has been an extensive progressive diminution in the white markings; the median fascia is the only white marking remaining in *fasciella*.

In *gaultheriella* (Fig. 91) and *nemoris* (Fig. 90), there is no median fascia; instead of it a pair of costal and dorsal streaks. In *nemoris*, the first pair of streaks meet, forming a fascia; in *gaultheriella*, they are separate.

Lastly, there is that group of four species, in which a white longitudinal streak extends from the base along the dorsal margin, reaching to or beyond the middle. These are *mediodorsella* (Fig. 92), *quercivorella* (Fig. 93), *ulmella* (Fig. 95) and *conglomeratella* (Fig. 94). In the two former, this streak stops abruptly at the middle of the dorsal margin; in *mediodorsella* (Fig. 92), it connects with

the dorsal arm of an angulated fascia. In *ulmella* (Fig. 95) and *conglomeratella* (Fig. 94), the white streak extends almost to the tornus, where it connects with a dorsal streak running obliquely into the apex.

A rather noteworthy feature common to both divisions of the genus is this: the third white fascia or the third pair of streaks, whose extremities are placed over the tips of veins 2 and 10, are never displaced from their normal position, and only in rare instances are they much oblique. These instances are almost entirely confined to Division II. In such case, the impression of length and obliquity is gained through the fact that the more apical portion of this streak is homologous with the white streak over vein 5. The greatest changes have taken place in the positions of the first two pair of streaks, resulting in their displacement toward the base.

In either of the two divisions of the genus, the greatest number of more or less distinct bands of ground color has been seven. The first of these crosses the base of the wing and is usually confluent with the second in the costal half of the wing. The position of the white unpigmented areas separating these bands of ground color appears to be determined by the points of origin or by the tips of the longitudinal nervures. The question to be decided is whether such a banded arrangement of pigment areas represents the primitive type of coloration, and if so, how has evolution acted in bringing into existence the present great complex of species.

A group of species (Figs. 59*a*, 59*b*, 60, 61, 62, 63) more primitive in generic structure, namely, *Cremastobombycia*, shows a type of coloration strikingly similar to that of some of the species of the "flat-larval group." An examination of this group discloses the fact that nowhere are there more than four costal white streaks as compared with five or six in some of the species of the more recent branches of the genus. Apparently, then, because of the fewer separate bands of ground color present in species of this group, the primitive type of marking is not to be sought for among the species of the ancestral group.

The observations that have been made point to the conclusion that the primitive type of coloration is made up of seven distinct transverse bands. The results of the investigations upon the development of color in the pupal wings, now to be presented, confirm this view and, in addition, furnish evidence of the means by which transformation of the bands into the various types of color pattern has been accomplished.

(*d*) Ontogenetic Development of the Color Pattern.

1. *Historical.*

Tower ('06) has summarized the general results of researches upon the development of colors in pupal wings as follows:

"The studies upon the origin of color in the wings of Lepidoptera have shown that there is a regular order of development, not only of colors but also of the areas in which spots and stripes appear. The wings, which are colorless

at first, become opaque, yellowish or light drab, beginning first near the base of the wing and spreading distalward. Soon spots, stripes and adult markings appear, at first proximad, then more and more distad, then between the nervules and, last of all, upon the nervules. First, the purely pigmental or chemical colors develop, and these are followed by the chemico-physical."

The principal researches have been those by Schäffer ('89), Van Bemmelen ('89), Urech ('91), Haase ('93), Mayer ('96) and most recently by von Linden ('98, '02). The principal work of the first three authors was upon *Vanessa* and *Pyrameis*. Van Bemmelen ('89) has shown that the first color to appear in *Pyrameis cardui* is a pale brownish yellow which deepens to the reddish brown ground color; upon this ground color, the black spots appear. The development of the color in *Vanessa urticæ* follows very much the same sequence, as pointed out by both Van Bemmelen and Urech. Urech ('91) has shown that in *Vanessa io*, the adult spots and colors appear directly upon the primitive white of the pupal wing; that is, the yellow appears over a restricted area of the wing; following this, a reddish tinge appears, which, over another portion of the wing, gradually deepens to the reddish brown ground color. Later, the adult black spots develop directly upon the primitive white wing; some at least of the white spots of the adult represent the primitive white of the pupal wing. In Van Bemmelen's opinion, a considerable amount of modification takes place in the wings after the first appearance of color, so that the adult design may differ considerably from that first laid down. Urech's ('91) view is directly opposed to this; according to him, the different color areas are definitely laid down from the beginning and are therefore older phylogenetically than the particular colors of the adult wing. He therefore regards color as the important factor in determining phylogenetic position—"die Farbe ist das Primäre, die Zeichnung das Secundäre."

Haase ('93) worked upon several species of *Papilio* and found that the wings are transparent or colorless, later becoming whitish; this white then gives way to a yellowish ground color upon which the adult colors begin to appear, undergoing considerable development before reaching their definitive adult condition.

Mayer ('96) traces the development of the scales from modified hypodermis cells, the "formative cells of the scales," from their first appearance as blunt outgrowths from these cells until they are fully formed and pigmented. In addition to confirming the conclusions of previous investigators as to the sequence in the appearance of colors, Mayer has shown that "the transparent condition of the wings corresponds to the period before the scales are formed and to the time when they are still completely full of protoplasm. The white condition is caused by the withdrawal of the protoplasm from the scales, leaving them as little hollow bags filled with air. In this condition, they diffract the light and appear pure white.

"After the protoplasm has completely withdrawn from the scales, the

'blood' or hæmolymph of the pupa enters them, and soon after this, the wing becomes of a uniform dull yellow or light drab color. This color is due to the fact that soon after the hæmolymph has entered the scales, it changes to a dull ochre-yellow and finally to a drab color. The same change takes place in hæmolymph which has been removed from the pupa and exposed to the air. The mature colors are due to chemical changes in the hæmolymph itself. They first appear in places *between* the nervures, never upon the nervures themselves. The last places to acquire the mature coloration are the outer and costal edges of the wings and the nervures. . . .

"Dull ochre-yellow and drabs are, phylogenetically speaking, the oldest pigmental colors in the Lepidoptera, for these are the colors that are assumed by the hæmolymph upon mere exposure to air. The more brilliant pigmental colors, such as bright yellows, reds, greens, etc., are derived by more complex chemical processes. We find that dull ochre-yellows and drabs are at the present day the prevalent colors among the less differentiated nocturnal moths. The diurnal forms of Lepidoptera have almost a monopoly of the brilliant colorations, but even in these diurnal forms, one finds that dull yellow or drab colors are still quite common upon those parts of their wings that are hidden from view."

The most recent researches upon the subject of development of color in the pupal wings of Lepidoptera are those of von Linden ('98, '02). The results of her investigations are embodied in two papers, the first being practically included in the second. Her observations lead to the conclusion that the adult color pattern develops from a number of separate transverse bands which dispose themselves upon a uniform ground color in a manner characteristic of each species. A distinction is thus made between ground color and that forming the color pattern. These transverse bands (longitudinal according to Eimer's view) occupy definite positions upon the wing determined by the course of the nervures and tracheæ. This is the condition found among Papilios, Vanessas, Sphingids, the higher Bombycids and even among some of the Geometrids. These larger bands are formed by the broadening out and fusion of narrower bands ("bandelettes primaires") preserved only among more primitive forms. On the one hand, the bands may fuse to form a uniform color; on the other, they may break up into a series of spots, which become smaller as the ground color encroaches upon them. The hindwing is arrested at a point less advanced than the forewing; this, combined with the greater tendency toward fusion of the bands which is in fact due to the modified form of the hindwing, creates the erroneous impression that the hindwing is more advanced than the forewing.

The author claims that her results support the laws which Eimer has promulgated for species differentiation based upon a study of adult coloration:

"*Il est donc évident que les lois que Eimer a trouvées en étudiant la phylogenèse du dessin des Lépidoptères peuvent être admisés point pour point pour l'ontogenèse.*

"Mes reserches preuvent donc que le dessin des Papillons ne parait pas soudainement, . . . que les phases que ce dessin parcourt pendant son developpe-

ment ontogénétique, sont analogues aux phases que le dessin de l'espèce du Papillon a dû parcourir pendant son developpement phylogénétique, que le loi qui gouverne la biogenèse est aussi confirmée par ce procédé, qui s'accomplit pendant la métamorphose de l'insecte, et qu'en fin les théories de Eimer sont solidement fondées, quand il dit que chaque animal ne peut varier que dans peu de directions determinées par les influences du dehors et par sa propre constitution, et que l'espèce se forme par génépistase."

Recapitulation is, however, only partial and confined to primitive forms:

"Les phénomènes de la phylogenèse se produisent le plus clairement dans le developpement du dessin chez les formes *les plus primitives.* Chez les groupes *les plus advances*, ces phénomènes sont masqués par l'intervention dela tachygenèse qui montre sa plus grande influence dans le developpement des ailes infèrieures."

With regard to the succession of colors upon the wing, the same author finds that it is only in the primitive forms that the scales forming the dark markings pass through the intermediate shades of yellow to reach their final gray or black condition; in the higher forms, they remain uncolored until the scales forming the ground color reach their full development, later passing directly from the colorless stage into gray or black. The color appears first at the tip of the scales, spreading gradually to the base. Scales which are destined to acquire their pigment later are not fully formed when the scales of the ground color attain the adult form and color. Therefore, color may be taken as a measure of the degree of development of a scale.

2. *Methods.*

In the study of the development of color in the wings of *Lithocolletis*, specimens of the summer generations were used for observation. No overwintering pupæ have been observed. In the summer generations, the average duration of the pupal state is about a week; it may be as short as four or five days.

The chrysalids were removed from the mines shortly after pupation and kept under careful observation. For some time, no change in the brown color of the pupa is to be observed, then two faintly darker brown spots, corresponding in position with the eyes of the imago, become visible through the pupal envelope. These spots rapidly turn black, and very shortly after, the wings, which up to this time have appeared transparent through their thin chitinous envelope, begin to lose their transparency. This marks the beginning of the white stage. A day or two later, the yellow colors begin to appear upon the wing. The chief difficulty in the study lies in securing a suitable series of these earliest stages, as the colors are very faint at this period, and numerous dissections are often required before the necessary material can be obtained. In later stages, the markings are visible through the pupal envelope, and a choice of specimens can be made with relative accuracy.

The dissections were made in .6 per cent NaCl solution under a simple

dissecting microscope of moderate power by means of fine needles set in matchsticks. One needle is inserted through the abdomen and held rigid; another through the middle of the upper side of the thorax. The second needle is now drawn forward, tearing apart the pupal envelope and carrying with it the anterior part of the thorax with wings attached. The structure of the pupa with separate envelopes for wings and legs in the lower Microlepidoptera renders this method of procedure highly successful. The thorax may now be torn apart, allowing the wings to float out flat. With a little experience, it is possible to remove the wings in this manner without the displacement of either scales or cilia. The wings thus removed from the pupa vary in length from 1.5 to 2 mm., being, therefore, about one-half the length of the imaginal wings.

The wings were examined with a simple lens to determine the general extent of the color areas. For the more accurate observation of the positions and limits of pigmented areas and individual scales pigmented, I have used a compound miscroscope, 16 mm. objective, 4x eyepiece, giving a magnification of 60 diameters. The observations were made almost entirely by reflected light and under a cover glass. In the early stages, where the colors are very faint, I have found black paper, as suggested by von Linden, very useful for a background. Somewhat later, a pure white background is advantageous in the detection of the first appearance of grayish tints.

All of the wings were examined in .6 per cent NaCl solution, shortly after removal from the pupa. Observations made thus are vastly more satisfactory than when permanent mounts are employed. A number of the wings were, however, transferred to absolute alcohol between pieces of glass to prevent curling, and after about an hour embedded in Venetian turpentine made as follows:

Commercial Venice turpentine is mixed in a tall cylinder glass with an equal volume of 95 per cent alcohol. The mixture is allowed to stand in a warm place for three or four weeks and then decanted.

The mounting medium thus prepared is thin enough to flow easily and not displace the delicate cilia. However, the attendant darkening of the colors is a disadvantage in comparing with adult specimens.

I have found it possible to preserve all except the earliest stages without the use of a mounting fluid, if the slide containing the wing under a cover glass is immersed in absolute alcohol for a short period. Later the cover glass may be closely appressed and fastened down around its edges.

Both forewings in each specimen were examined; the two sets of observations thus serving as a check on one another. In the following descriptions, reference is made to the forewings only. The hindwings are practically unicolorous, usually paler than the forewings, and reach their final development somewhat in advance of the forewings. Their development yields no new facts, merely confirming the results of earlier investigators upon the sequence of colors.

3. *Observations.*

Two factors were taken into consideration in determining the choice of species to be studied, namely, the general type of adult marking and the presence or absence of certain characters such as an apical spot or dark marginings adjacent to white streaks or fasciæ. The object of the research is twofold: (1) to determine, if possible, the primitive or fundamental color pattern and its mode of transformation into the adult pattern and (2) to determine the relative time of appearance and manner of development of the various dark markings, the characters referred to above.

The evidence furnished by the development of color in the pupal wings taken in conjunction with a comparative study of the adult markings has convinced me that the primitive color pattern is composed of a series of uniformly colored pale yellow bands, seven in number, placed transversely on the wing and separated from one another by white fasciæ (unpigmented areas) (*Fig. 8*). These bands are typically straight and, with the exception of the first, cross the wing almost perpendicular to the margins. The bands, when present in their primitive condition, have certain defined positions. Their hypothetical typical positions are illustrated by *Fig. 8*. In what follows, it will be noticed that there is a definite relation of bands to veins. Band I occupies the extreme base of the wing, beginning at the base of the dorsum and broadening on the costa; the white streak which separates it from Band II passes obliquely from the base of the dorsum toward the costa, lying over the point of origin of the tubular portion of the lower median vein. Band II crosses the wing on the basal side of the tip of vein 12; the position of the white fascia which separates it from Band III seems to be determined rather by the point of origin of the tubular portion of the upper median vein than by the tip of vein 12, as this vein often extends considerably beyond the origin of the upper median vein without causing a corresponding broadening distally of the second band. It sometimes happens that vein 12 is unusually short, and then the white fascia lies over its tip and over the origin of the upper median vein. On the costa, the inner border of Band III lies just beyond the origin of the upper median vein, and on the dorsum, the outer border extends almost to the tip of vein 1*b*. Band IV crosses beyond the tip of vein 1*b* and lies over the bases of veins 10 and 2, its outer border being just within the tips of veins 10 and 2. Band V on the costa is placed between veins 10 and 9, on the termen between veins 2 and 5 and lies over the transverse vein. Band VI is placed between veins 9 and 7 on the costa and beyond vein 5 on the termen. Band VII crosses the apex of the wing. Thus it will be seen that the position of the bands is largely determined by the position of the longitudinal nervures, the tips of the veins marking the extremities of the unpigmented fasciæ separating the bands. In no case in the adult has this pattern

Fig. 8. Hypothetical primitive color pattern of the forewing of *Lithocolletis.*

been preserved in its original primitive condition as seven distinct transverse bands; fusions either partial or entire have taken place between two or more adjacent bands. Displacements have also occurred, due to a shrinking away of color from one side of a white interspace and its extension over the white on the other side. Finally, some of the bands may have shrunk away almost entirely.

The following is a list of the species in which the development of the pattern has been traced from the first appearance of color to the adult markings:

Lithocolletis tiliacella Cham. *Lithocolletis tritænianella* Cham.	Species in which two or more of the bands have been preserved almost in their primitive condition as respects position and shape.
Lithocolletis cratægella Clem. *Lithocolletis ostryæfoliella* Clem. *Lithocolletis lucidicostella* Clem. *Lithocolletis morrisella* Fitch *Lithocolletis hamadryadella* Clem. *Lithocolletis bethunella* Cham. *Lithocolletis ulmella* Cham. *Lithocolletis æsculisella* Cham. *Cremastobombycia ignota* F. and B.	Species in which changes in shape or position or both and more or less complete fusions of some of the bands have taken place and certain differentiations and specializations have appeared, such as the development of black scales at places other than those directly contiguous to the white interspaces between the bands.

In the following species, the development of the pattern was observed only in part for the purpose of comparing the development of certain characters in these species with that of similar characters in related species, or with a view of determining the relative time of appearance of certain characters:

Lithocolletis hageni F. and B.
Lithocolletis robiniella Clem.
Lithocolletis caryæfoliella Clem.
Cremastobombycia solidaginis F. and B.

In all of the species studied, the wings are at first transparent and glassy in appearance, corresponding to the period, as observed by Mayer ('96), before the protoplasm has been retracted from the scales. Following this is the so-called white stage, in which the wings appear by reflected light almost pure white and by transmitted light pale buffish, due to the hæmolymph contained within them. The scales are at this period colorless and transparent, containing only air. The white stage lasts from one to two days, giving way to a pale yellow over certain defined areas, as the hæmolymph enters the scales and the pigment begins to form. This yellow color may be preserved throughout pupal development almost as originally laid down, or it may go through a process of transformation before reaching the adult condition. In either event, it gradually deepens in tint and constitutes the ground color upon which the dark streaks (margins)

and spots are to appear. The development of the pattern takes place very rapidly during the last part of the pupal state. The time intervening between the first appearance of a tinge of yellow on the wings and the emergence of the imago is largely dependent upon temperature and is often less than twenty-four hours. Development takes place more rapidly in day time than at night and is strikingly retarded during cloudy weather.

Lithocolletis tiliacella Cham.

In the first specimen examined, the wings were removed from the pupa at a very early stage of development. The yellow color is scarcely differentiated from the clear buffish white wing (*Fig. 9*). The only bands which can be distinguished are II, III and IV. Band II crosses the wing just before the tip of vein 12, thus occupying its primitive and typical position. It is the palest and least defined of any of the three bands present. Its outer edge is definitely defined, but its inner edge fades into the clear basal part of the wing, the color being extended farthest toward the base just within the costal and dorsal margins. Band III has also preserved its primitive position and form. It is somewhat darker than II, but uniformly colored throughout its breadth, the outer edge not darkened. Its width is scarcely greater than that of the clear band preceding it. Band IV is the most deeply colored as well as the broadest of the three bands; it is of the same breadth as in the adult. Even at this early stage it is prolonged outwardly almost to the end of the cell. The entire apical part of the wing and cilia are of the clear whitish color, there being no indication whatever of bands.

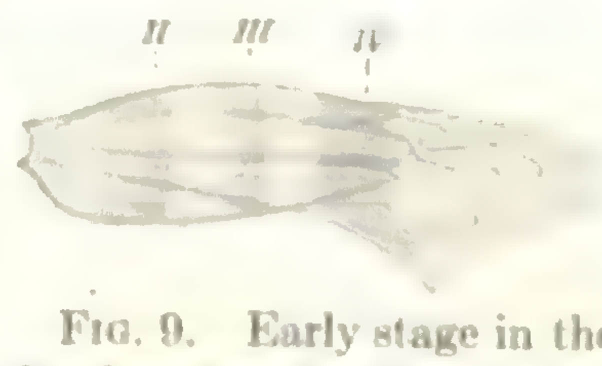

FIG. 9. Early stage in the development of color in the wing of *L. tiliacella*.

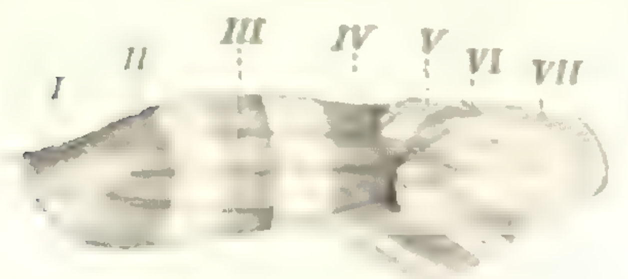

FIG. 10. Later stage in the development of color in the wing of *L. tiliacella*.

The wing in the next stage examined shows considerable advance over the stage just described (*Fig. 10*). There has been a decided deepening of color, and the adult pattern has been laid down, with the possible exception of Bands VI and VII, which have not as yet been clearly differentiated as bands although there is a faint yellow tinge in a few of the scales in the apical portion of the wing. These bands are usually indistinct and sometimes absent even in the adult. Band I is united with Band II along the costa; this condition was apparently not produced by the independent origin of Band I and its later fusion with II but by a uniform and gradual deepening of the wing below the costa. The outer edge of Band II is now somewhat bent outward in the middle, and the scales in the middle of the outer edge are beginning to deepen in color, thus foreshadowing the appearance of the dark margin, but there is as yet no *brown* pigment in the scales. Band III is also somewhat bent outwardly as in the adult, and its dark margin is present on the costa and dorsum only, the costal margining being much less distinct than the dorsal; neither extends more than a

short distance onto the wing proper. The middle of Band IV is faintly connected with a pale band beyond, which represents Band V. Its margins have reached more nearly their adult condition than any other of the wing markings. The margin on the dorsal half is almost as greatly developed as in the adult; that on the costal half is represented only by a few black scales.

The next stage studied shows no further change in the shape or extent of any of the bands, the changes which have taken place being confined to continuation of processes already begun, namely, the deepening of the outer edge of Band II, thus forming the internal margin of the first white fascia in the adult, the approximation of the costal and dorsal parts of the margin of Band III, so that they are now but little separated, and their darkening to the adult color, the advance of the margins of Band IV to their adult condition, the deepening of Band V so that it now appears quite distinct and as in the adult.

This is the only species studied which shows any distinction between the bands in regard to their relative time of appearance. Bands II, III and IV are the first to appear, and in the youngest specimen examined, Band IV was decidedly in advance of the other two as shown by its deeper color and by its extension outwardly in the middle. It is, therefore, probably safe to assume that Band IV is in this species, the earliest to appear ontogenetically. As will be shown later, *L. tiliacella* has probably in many respects conserved more closely than any other of the now existing species the primitive type of color pattern, and hence the sequence observed in the appearance of the bands in the ontogeny may also be true for the phylogeny.

Lithocolletis tritænianella Cham.

At the earliest stage at which it is possible to discern any indication of marking, five very pale yellow bands are visible upon the wing (*Fig. 11*). These are uniformly colored and straight and are placed transversely upon the wing, showing no signs of fusion with one another. The first of these is, in fact, I + II, as shown by the faintly paler streak extending into it from the base of the dorsum. The second, Band III, occupies its usual position, but in this case the position of the white fascia separating it from II is wholly determined by the point of origin of the upper median vein, as vein 12 extends for a considerable distance into Band III. The third, Band IV, is normal in position and shape. That the fourth band is in reality composed of Bands V and VI is shown by its origin just beyond the tips of veins 10 and 2 and by its extension distally over the tips of 9 and 5 which in the primitive color pattern mark the position of the white fascia separating Bands V and VI. Band VII crosses the apex of the wing. The white interspaces between Bands II and III and between III and IV are of about the same width as in the adult, but that between IV and V + VI is considerably wider and shows no indication of the angulation which

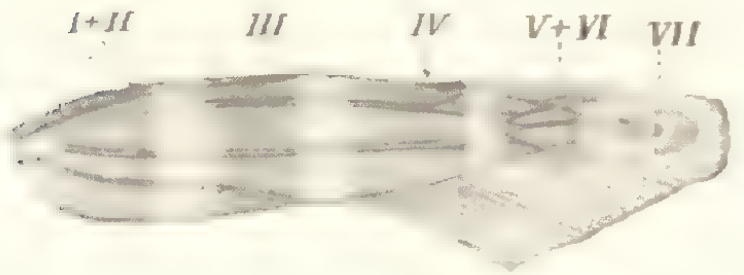

FIG. 11. Early stage in the development of color in the wing of *L. tritænianella*.

is present in the adult; that is, Band IV has not yet begun to extend outwardly through the cell. The space separating V + VI from VII is at this stage about one-half the width of V + VI and extends entirely across the wing, thus differing strikingly from the condition found in the adult.

The development for some time consists merely in a uniform darkening of the ground color as first laid down without any change in the extent of the bands. At a somewhat later stage, simultaneously with the darkening of the ground color into the adult shade, changes in shape and more complete fusions of some of the bands occur. As soon as the adult color has been attained, the dark margins begin to develop. A specimen examined at this period shows that while no change has taken place in the form or extent of Bands I + II and III, Band IV has become outwardly angulated as in the adult, thus narrowing, especially in the middle of the wing, the white fascia separating it from V + VI. On the dorsal margin, Bands V, VI and VII are completely fused, the small white costal streak before the apex alone remaining to mark the position of the white fascia between V + VI and VII. The scales along the outer edges of Bands II and III are beginning to show faintly brownish tips, this color being about evenly distributed along the entire edge of Band II; in Band III, the color extends farther toward the bases of the scales in the middle of the wing. The scales of the dorsal half of the outer edge of Band IV are dark reddish brown, almost as in the adult, but on the costal half of the wing, there is only a very slight deepening of the yellow color, the margin here being considerably paler than the margins of Bands II and III. There is a very slight deepening of scales on the outer border of Band V + VI, adjacent to the white streak before the apex. The dusting in the apex is dense, the color being darker and more blackish than the outer margin of Band IV, and extends from the white streak well around the apex and along the dorsal margin almost to vein 5. This dusting is considerably greater in extent even in this stage than that of the overwintering forms in any stage.

Lithocolletis cratægella Clem.

This species belongs to that large group in which the imago is characterized by the presence of pairs of opposite white costal and dorsal streaks; that is, all of the original primitive bands have fused at least along the middle of the wing. *L. cratægella* (Fig. 36, Pl. III) possesses in addition a margined basal streak, external as well as internal margins to the white streaks (*i. e.*, the dark scales developed on both sides of the primitive bands and not only on the outer side, as in the two preceding species), a streak of dark scales along the middle of the wing, a patch of black scales in the apex and the blue iridescence of the scales in the cilia. The study of the development of the wings in this form should therefore throw light upon the origin and mode of development of the above characters and indicate their relative time of appearance.

In the earliest stage examined (*Fig. 12*), at a period when the markings are

pale yellowish and but little differentiated from the colorless wing, the pattern strikingly resembles that of the adult insect. The white basal streak is distinctly outlined, beginning at the base of the dorsum, where it seems to be homologous with the white streak separating Bands I and II, beyond this lying over a trachea which extends through the cell just above the middle; its tip seems to coincide with some portion of the white fascia separating Bands II and III. The white patch near the base of the dorsum is identical with that in the adult and with the apex of the basal streak seems to constitute the last vestige of the white fascia separating Bands II and III. On the dorsal margin, the outer edge of Band III has shrunk away toward the base, and at the same time, there has been a compensating extension of Band IV toward the base, resulting in a displacement of the white streak, so that instead of being over vein 1*b*, it is basal to it, and vein 1*b* reaches the margin well within Band IV. The first pair of streaks are already separated by a narrow line, which is not nearly as broad internally as in the imago. At this stage, the costal white streak is not much narrower on the margin than the dorsal. Bands V, VI and VII are situated normally, except that V on the dorsum extends a little basally over the tip of vein 2. These bands, while quite distinct on the margins and in the cilia, seem to fade away in the middle of the wing. The entire middle of the wing, from the tip of the first dorsal white streak almost to the extreme tip of the wing, remains colorless, so that it is not possible to distinguish the bands from the interspaces separating them. A comparison with the adult shows that this area coincides with that to be occupied by the dark streak of scales through the middle and by the apical patch of black scales.

Fig. 12. Early stage in the development of color in the wing of *L. cratægella*.

In a specimen somewhat more advanced, there has been a slight deepening of color, but by no means, even in the golden color, has the adult shade been attained. The color is still yellow, with no tinge of brown, unless the slight darkening of the dorsal side of Band IV, especially toward the second white streak, may be regarded as a foreshadowing of that color. The middle of the wing from the tip of the first dorsal streak almost to the apex (except for the grayish black scales to be noted below) still retains its whitish appearance. Just before the apex and beginning just under the tip of vein 7, and extending for a short distance along the underside of 7, are a number of grayish black scales. These appeared first beneath the tip of 7 and were gradually extended toward the base. The patch is broadest toward the apex, where it reaches almost across the wing. The inner edges of the first pair of streaks are more curved than in the preceding specimen as a result of the broadening internally of the yellow line separating them. The scales attached around the apex are yellow and extend in an unbroken line to the second dorsal streak, that is, Bands V, VI and VII have united along the termen. However, the scales whose apices project beyond these and which are destined to constitute the iridescent blue line in the cilia still remain pure white.

A specimen at a somewhat later stage (*Fig. 13*) shows a little more of the orange brown tint, but the color is nowhere as deep as in the adult. The formerly colorless area in the middle of the wing is still distinctly set apart from the rest of the wing but has become narrower and is beginning to acquire a faintly yellowish tinge. The white streaks are now definitely blocked out due to the curving in of the yellow color; they are, however, still connected with the whitish middle portion of the wing. The patch of blackish scales near the apex has increased in extent and depth of color until its identity with the patch of *black* scales in the apex of the adult wing is clearly established. It has now reached its adult condition, and no further change takes place. The early origin and differentiation of this patch of scales shows clearly that it is a character quite separate and distinct from the dark line of scales in the adult extending from it toward the base of the wing. The scales around the apex, yellow in the earlier stages, are now tipped with pale brown, but the outermost row of scales are still whitish as before. There is some deepening of the ground color just before the first and second pairs of streaks; the second dorsal streak, however, is the only streak which can be said to have acquired a definite margin, and even this is pale brownish. The basal streak remains entirely unmargined.

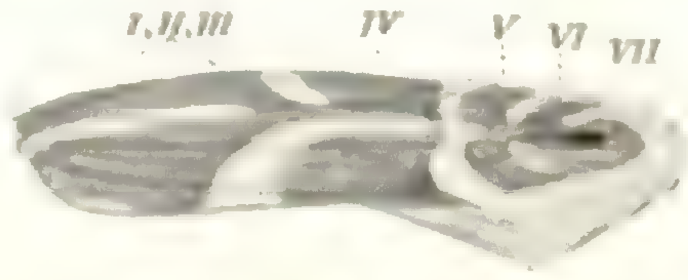

Fig. 13. Later stage in the development of color in the wing of *L. crataegella*.

In a specimen at a little later stage than that just described, internal margins, though very pale, have appeared along all of the white streaks; that of the second dorsal still continues to be in advance of the others. The margin of the first costal streak has deepened somewhat, and there is a faint suggestion of gray around its tip. A similar pale gray shade extends from the tip of the first dorsal streak through the middle of the wing and around the tip of the second dorsal streak. The ground color along the upper edge of the basal streak is somewhat darkened, but there is no margin.

In a wing at a considerably later period of development, the ground color approaches the adult color over those areas where there are no brown scales. The internal margins of the costal and dorsal streaks, as well as the upper margin of the basal streak, are dark brown; the external margins of these streaks and the margin around the tip of the basal streak while present are not as dark as in the adult and show a decidedly grayish tinge. This same gray color is prolonged from the tip of the first dorsal streak along the middle of the wing in the area formerly colorless but is much paler than in the adult. This difference from the adult color is especially noticeable above the patch of black scales, where in the imago there is a decided deepening of color, almost blending with the black patch. There is but very little deepening of color between the first and second dorsal streaks, and the margin of the second dorsal streak is neither as deep nor as wide as in the adult. The darkening of scales in the cilia started in earlier stages still continues. There is, however, no change from the colorless condition of the scales which are to be deep iridescent blue.

The adult coloration appears to be attained several hours previous to emergence. At this time the markings are plainly visible through the pupal envelope. The bluish iridescence in the cilia is now well developed. Obviously this is one of the last characters to appear ontogenetically.

Lithocolletis ostryæfoliella Clem.

This species (Fig. 23, Pl. III) possesses an apical dot in its typical condition, composed of small black or blackish brown scales arranged in an almost circular shape over the tip of the wing.

In the youngest specimen examined, the wings were dissected out at a period when they were losing their whitish appearance and becoming faintly banded. The last four bands are straight and placed transversely on the wing, leaving colorless bands between them. The basal portion of the wing is exceedingly pale, and the ground color is scarcely discernible on the otherwise colorless wing. The configuration of the color areas is much the same as in the adult, there being the same outward angulation of Band III, internal to the first pair of white streaks. A stripe along the middle of the wing and a white spot on the dorsal margin remain colorless and mark the position of the basal streak and the white dorsal spot in the adult.

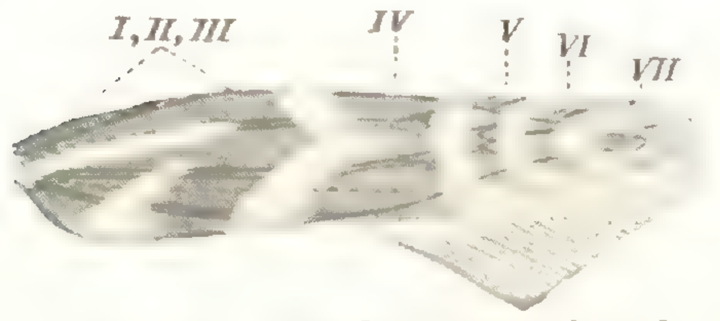

Fig. 14. Early stage in the development of color in the wing of *L. ostryæfoliella*.

At a slightly later stage, the markings just referred to have become a little more distinct; the color is still a very pale straw (*Fig. 14*). The extreme base of the wing, while very pale, is still sufficiently contrasted with the unpigmented areas to show the outline of the basal streak defined for its whole length. On the dorsal edge, a pale shade broadest on the dorsal margin reaches two-thirds of the way across to the basal streak. On the basal side of this spot, the ground color seems a little deeper. Band III, although much angulated outwardly, is not yet connected in the middle of the wing with Band IV; thus the first pair of white streaks are still connected and form an angulated fascia, broadest at its extremities. Bands IV, V, VIand VII remain entirely separate and retain their primitive straight edges, with the exception of the inner edge of Band IV which has been somewhat produced toward the base at its extremities. Band III and Band VII are possibly a shade darker than the other portions of the wing; the scales attached around the apex projecting into the cilia are, however, paler and concolorous with Bands IV, V and VI.

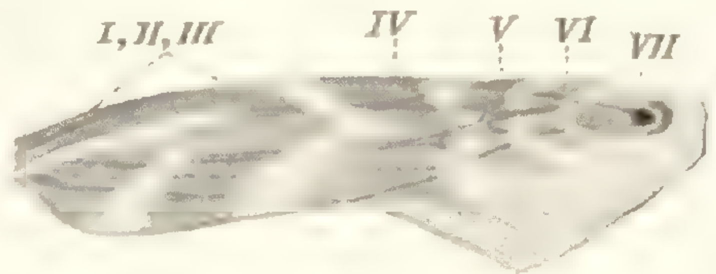

Fig. 15. Later stage in the development of color in the wing of *L. ostryæfoliella*.

The ground color continues to darken, reaching its adult condition at a relatively earlier stage than is the case in *L. cratægella*. At the same time (*Fig. 15*), the pale yellow spreads onto places originally unpigmented; thus the bands become connected by a paler yellow shade, so that the white fasciæ are transformed into pairs of opposite narrow white streaks. At this stage in the develop-

ment, there are four dorsal as well as four costal streaks. The apical dot is present, dark brown and almost as large as in the imago and very definitely outlined. Around the extreme apex, the scales projecting into the cilia are tipped with brown, this color being deepest just opposite the apical dot but quickly fading out on either side, so that it does not reach to the last pair of white streaks. The apical spot and these few scales around the apex are the only scales on the wing which show the slightest sign of brown; the bands are, however, a little deeper yellow on their outer than on their inner borders.

Very soon after the stage just described, the dark margin of the second dorsal streak begins to develop; at this time, it consists of a few darker and slightly grayish tinted scales somewhat removed from the dorsal margin. The apical spot is brownish black and seems to have reached its final development. The line in the cilia, though darkest immediately opposite the apical spot, is plainly visible from the fourth costal to the third dorsal streak, thus passing below the fourth dorsal streak which at this stage has almost disappeared owing to the fusion of Bands VI and VII.

Very little change is now needed to reach the adult condition. The margins of the second pair of white streaks continue somewhat in advance of the others and reach their final stage of development a little earlier. All trace of a fourth dorsal streak finally disappears.

Lithocolletis lucidicostella Clem.

At the time of the first appearance of a pale yellow tinge upon the wings, it is possible to discern faintly four bands in the apical half of the wing. Just before the apex within the area occupied by Band VII is a small colorless spot. With the exception of the fact that these four bands are not connected along the middle of the wing, the adult color areas (Fig. 44, Pl. III) are now laid down. The dorsal portion of Band IV, the most proximal of these four bands, is continued toward the base, as in the adult, by a pale yellow streak along the fold. Its costal portion is preceded by a white streak bordered internally by pale yellow which is extended along the upper median vein to the base.

The apical dot is the first dark mark to make its appearance. While the yellow is still very pale, the scales of the formerly colorless spot near the apex begin to take on a grayish tinge. The deepening of scales over this area seems to take place in very much the same manner as that of the dark scales before the apex in *L. cratægella*.

The apical spot continues to deepen and increase in extent, reaching its adult condition before there is any indication of the formation of dark margins. The development of the apical spot is accompanied by a gradual and uniform deepening of the ground color together with the fusion of all the bands in the middle of the wing and of VI and VII on the termen. The middle portions of the wing between the apices of the white spots are somewhat paler, showing where the pigment has recently appeared.

The darkening of scales in the cilia around the apex and just below it on the termen and the dark margins of the first costal and dorsal streaks are the next characters to appear. A wing examined at this stage shows the scales in the cilia brownish with scarcely a tinge of gray, the margin of the first dorsal streak somewhat paler and brownish yellow, extending from the cilia to vein 2, and the margin of the first costal streak pale and scarcely distinct. These observations are in agreement with those made on *L. cratægella* and *ostryæfoliella;* namely, that the dark markings appear earliest in the apex of the wing on Band VII and soon after on Band IV.

The process of development consists now merely of the gradual appearance and darkening of the margins of the other streaks and the extension of the line in the cilia to the first dorsal streak.

Lithocolletis morrisella Fitch.

At a period when the entire wing, viewed by transmitted light, seems uniformly colorless, the white markings as seen by reflected light are definitely laid down as they will appear in the adult (Fig. 48, Pl. III) and have already acquired the lustrous pearly tint characteristic of the adult. This white appearance is due entirely to the structural modification of the scales described earlier in this paper and cannot be in any way ascribed to a precocious development of the scales over these areas, since, when examined, all of the scales of the wing are seen to be fully developed.

With the first appearance of pigmentation, a pale yellow suffuses those portions of the wing only which are destined to be yellow in the adult (*Fig. 16*).

Fig. 16. Early stage in the development of color in the wing of *L. morrisella.*

In the basal half of the wing, therefore, the yellow is confined mainly to the region above the fold; there is, however, a faint yellow tinge just before the dorsal arm of the fascia. There is a scarcely discernible tinge of gray at the base of the dorsum below the basal streak and before the first dorsal streak. At the tip of the wing, over the area to be occupied by the apical dot, the scales are beginning to turn gray, those outermost being the deepest. Otherwise, the areas occupied by gray and black in the adult and by the white streaks appear by transmitted light uniform and colorless. Examination by reflected light shows that these two kinds of areas are not homologous, since the white streaks stand out clearly as structural modifications, while the scales margining them and those below the fold are duller and lack the pearly luster. The bands and the white fascia and streaks occupy their normal positions. The absence of a white streak over the apex of vein 7 is accounted for when it is seen that the apical spot has acquired such proportions as to cover the tip of vein 7, which in this and related species reaches the margin nearer to the apex than usual.

In the next stage examined (*Fig. 17*), the ground color has deepened somewhat, and decidedly more of the grayish tint has developed. The dorsal part

of the wing below the fold, to be occupied by black scales in the adult, is pale gray; beyond the fascia where the scales are merely brown tipped, the color is still yellow, concolorous with the rest of the wing. Internal and external margins of the streaks are beginning to form simultaneously, those of the first costal streak are the deepest. The change is direct from the colorless scales margining the white streaks to pale gray. The black streak in the fold beyond the fascia is at this stage composed of pale gray scales. The apical dot is still pale gray, but the outermost row of scales is much darker and continuous on either side with a line of gray scales extending from the fourth costal streak to the third dorsal streak. The scales whose tips are to form the dark line in the cilia are still white.

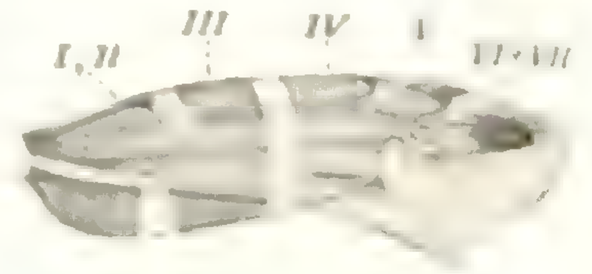

FIG. 17. Later stage in the development of color in the wing of *L. morrisella*.

On the next wing examined, the gray has decidedly deepened along the dorsal margin, but the golden color has not reached its final condition. The development of the margins has progressed considerably, but now the internal are decidedly in advance of the external margins. The former have a blackish color, especially toward the costal margin; the latter are still grayish. The external margin of the first costal streak is deeper than that of the others. The black streak in the fold has practically reached its adult condition. The apical dot has increased in size and color until its extent is now definitely defined. The scales around its outer edge, which in the preceding stage were the only dark ones, are now black. The line in the cilia is gray, but there is no indication of the bluish iridescence.

From this time on, no new characters appear, the development consisting only of a deepening of the colors to their adult condition.

The sequence of colors and the relative time of appearance of the various adult characters is very much the same in *L. robiniella* as in the species just studied. The apical spot and the black streak in the fold reach their final condition at a somewhat earlier stage in comparison with the development of the other markings.

Lithocolletis hageni F. and B.

This species (Fig. 17, Pl. III) possesses a well-defined apical dot, very decided external margins to the white streaks as well as the usual internal ones and a dark margin along the upper side of the basal streak. The margin along the upper side of the white basal patch is regarded as homologous with the margin of a basal streak, that along its outer side with the external margin of the white streak primitively separating Bands II and III. The streak of ground color beyond the basal white patch is, therefore, the dorsal portion of Band III.

Very few specimens of this species were available for study, but the observations confirm in general those made upon the five preceding species.

The apical dot appears well-defined and blackish at a period when Bands

V, VI and VII are still separated from one another by curved white fasciæ extending entirely across the wing and into the cilia (*Fig. 18*). The second pair of white streaks are still connected, but Band IV is beginning to project into them in the middle of the wing. At this time the ground color of the wing is a pale straw and lacks altogether the golden brown of the adult. The internal margins of the first and second dorsal streaks are beginning to form. The inner edges of the bands, bordering the streaks outwardly, present much the same appearance as they do in species where the white streaks never acquire external margins; that is, the ground color fades gradually into the white.

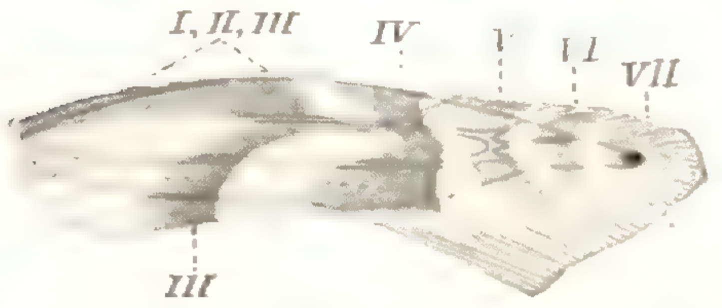

FIG. 18. Wing of *L. hageni* at the first appearance of the dark markings.

A dark line in the cilia begins to form soon after this; the scales showing the brown pigment at this time are not those which will be bluish iridescent in the imago; these latter remain pure white and only acquire their pigment later.

In the third specimen studied, the extent of the white streaks has been finally limited, and the golden brown color of the adult has been attained. All of the internal margins of the streaks, the dark scales at the apex of the first dorsal streak, those connecting the tips of the second pair of streaks and the two leaden-colored lines of scales running across the wing from the tips of the third and fourth costal streaks are present. In addition, external margins are present on the white basal patch and on the first dorsal streak. All of these borders are as they will appear in the adult. In this specimen, there was no indication of a deepening along the upper side of the basal patch. However, this observation cannot be accepted as altogether reliable in indicating the time of appearance of the margin of the basal streak, since the specimen was evidently abnormal, the apical dot not being present. No other specimens were available to decide the point. Imagoes of this species are occasionally found which lack both the apical dot and the dark margin along the upper side of the basal patch.

Lithocolletis æsculisella Cham.

The species heretofore studied have been those belonging to the group having cylindrical larvæ and characterized by the principal margins of the white streaks being internal. This species (Fig. 70, Pl. IV) and those following have the so-called flat type of larva, and the white streaks of the imagoes have their darkest margins on the outer side. That is, in the former group, the tendency is for the color bands to acquire first, dark margins on their outer edges; in the latter group, the condition is reversed, and the dark color appears first on the inner edges of the bands.

In *L. æsculisella*, at a period when there is scarcely any differentiation between ground color and bands, the pattern appears to be laid down almost as in the adult (*Fig. 19*). The bands are very pale buff, and judging from their uniform color, appeared simultaneously. The pale shade at the base which

separates Bands I and II extends entirely across the wing, but the early fusion of these bands on the costa is foreshadowed by the very faint tinge of buff just making its appearance in the costal portion of the pale fascia. On the extreme costa, Band V is indistinctly separated from VI. Band VI is separated from VII by a white streak extending entirely across the wing. With these exceptions, the yellow marks are defined as in the adult. The white oblique dorsal streak extends just within the termen, being separated from the white streak before the apex as in the adult. The distal end of the oblique dorsal streak is probably homologous with the middle portion of the white fascia which in primitive types separates Bands V and VI. In the imago, it sometimes exists as a separate small white spot before the apical dusting and more proximal than the oblique costal streak. Along the termen, the cilia are of an unbroken yellow color, showing that at the extreme margin, there has been a complete fusion of Bands V, VI and VII.

FIG. 19. Early stage in the development of color in the wing of *L. æsculisella*.

Before any of the dark margins begin to appear, the ground color deepens into the orange yellow of the adult. The external margin of the second fascia and the dark dusting at the extreme apex are considerably in advance of the other dark markings. The margin of the second fascia, formed by a dark line of scales along the inner border of Band IV, is most distinct in the middle portion of the wing and has not appeared on the extreme dorsal end nor on the costal end beyond the angle. Its color at this stage is brownish. In one specimen, the apical scales are not as dark as the margin of the second fascia; in another of the same age, as indicated by the state of development of the margins, the dusting of the apex is somewhat darker than the margin of this fascia; in both, however, the brownish tint is confined to the extreme apex. There is a slight darkening of the scales in the middle of the wing on the inner border of Band III adjacent to the first white fascia and along the under side of the oblique dorsal streak.

The dark margins of the fasciæ and of the oblique dorsal streak continue to develop, but before they reach their adult condition, the scales on the outer side of the costal spot over vein 10 begin to darken. At this time, the apical dusting is still confined to the apex of the wing and is not extended along the termen toward the tornus. This extension of the dusting toward the tornus is a characteristic of specimens appearing in the summer and does not occur in forms from overwintering chrysalids. It develops after the other adult characters have appeared.

Lithocolletis bethunella Cham.

In the youngest specimen examined, the ground color is a uniformly pale ocherous, and upon it the extent of the adult markings (Fig. 84, Pl. IV) is quite definitely blocked out (*Fig. 20*). The white fascia (or second pair of streaks)

is, however, prolonged outwardly at its angle along the wing to a position between the third pair of streaks. A comparison with the adult shows that the prolongation of the fascia is occupied by dusting on a whitish ground; that is, these white scales are destined to become black tipped. The third pair of streaks are situated normally over veins 10 and 2 respectively. There is no white spot over the tip of vein 9 on the costa. Bands V and VI have fused. A quadrate area in the apex remains colorless; the portion directly over vein 7 corresponds to the white streak normally situated here, the remainder will be occupied by dark dusting in the adult. The scales around the margin at the apex are yellow; these in the adult will be brown tipped *yellow* scales.

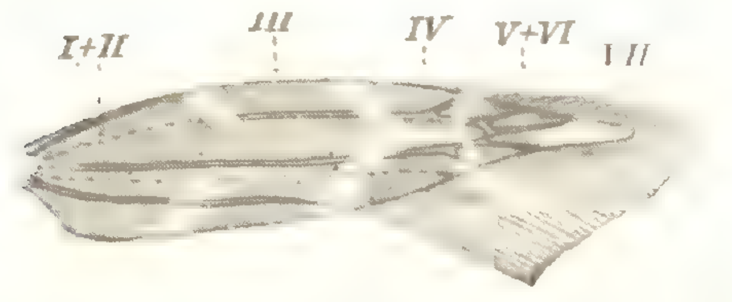

FIG. 20. Early stage in the development of color in the wing of *L. bethunella*.

In a wing at a somewhat later stage, there has been some deepening of the ground color. There is a small patch of scales just beyond vein 7 which are brown tipped and darker than any other scales on the wing. In the extreme apex, the scales extending over the cilia are not noticeably dark tipped. Dorsal to the dark patch of scales, the scales over the formerly colorless area become gradually paler, until near vein 5 their tips show just a faint tinge of gray. All the scales in the prolonged portion of the fascia are becoming pale gray tipped. There is also a faint gray tinge to the scales just below the tip of the dorsal arm of the fascia, continuous with the gray in the prolonged portion of the fascia. All of these scales are much paler than those in the apex just beyond vein 7 but approach in color those near vein 5.

The margins of the remaining streaks soon make their appearance; the dusting of the apex reaches the adult condition earliest.

A contrast in the sequence of development of dark marks is afforded by *L. caryæfoliella* Clem. In this species, the margins of the first and second fasciæ develop contemporaneously with a small patch of dusting at the extreme apex, and the margin of the second fascia is entirely complete, though not as dark as in the adult, at a stage when there is no indication of dark dusting beyond its angle. This dusting is very variable even in the adult, sometimes being very slight. The significance of the difference in development will be discussed later.

Lithocolletis ulmella Cham.

In this species, the pale yellow color appears simultaneously over all those areas which are to remain yellow in the adult (Fig. 95, Pl. IV) or in which the scales are *yellow* with brown or blackish tips. The white streaks and the white dusted portions of the wing remain colorless. Thus, the second costal streak is produced for a short distance along the cell, and the wing from vein 7 to the apex is colorless, but the scales around the apex and below the oblique dorsal streak, which are yellow with brown tips in the adult, have already acquired the pale yellow color.

In the next stage studied, the color has become almost as deep as in the adult. A number of the scales projecting from the extreme tip of the wing over the cilia are brown tipped; these are continued in a broken line through the cilia to the tornus. Over the wing membrane near the apex, in the area which was transparent in the earlier specimen, the scales are becoming dark tipped. These scales are deepest toward the apex of the wing, becoming very pale gray toward the tornus external to the oblique dorsal streak. A few scales along the costa corresponding in position with the dark scales in the adult are beginning to show darker tips. The scales margining the first and second costal streaks, which were whitish before, are now faintly gray. The color is uniformly developed over the whole margin and on the prolonged portion of the second streak.

In a specimen a little further advanced than the one just described, the apical dusting is almost as in the adult. This darker color does not quite reach the tornus; that is, the external edge of the white dorsal streak is still margined by pale gray scales as before. The margins of the first and second costal streaks have scarcely changed in color, but the scales in the prolonged portion of the second streak have darkened more rapidly; they are decidedly gray but much paler than those in the apex. The only new character which has appeared is the dark line through the cilia.

Lithocolletis hamadryadella Clem.

In the earliest stage examined (*Fig. 21*), the basal third of the wing is almost colorless. At the extreme base on the costal margin is a small patch of pale yellow scales, and a little beyond it another similar patch. These two patches of scales form Band I. Beyond these is a somewhat larger patch of pale yellow scales. This is the inner portion of Band II; the line of scales which marks its original outer limit in the adult (Fig. 77, Pl. IV) has not yet acquired any pigment. Band III at this stage is represented by a rather narrow angulated band which extends across the wing some distance before the tip of vein 1*b*. The white projects into its angle on the inner side. Band IV is composed of two separate patches of yellow scales, one on the costa and the other on the dorsum. Their pointed apices lie over the bases of veins 10 and 2 respectively, the normal position for Band IV, but on the margins, they curve back toward the base so that they are much farther removed from the tips of the veins than usual. The middle of the wing to the apex is colorless. Band V + VI is represented by a patch of scales on either margin. The dorsal patch originates just beyond vein 2 and extends over vein 5; the costal patch originates on the cell about midway between veins 10 and 9 but extends obliquely outward so that the inner edge on the costa is just basal to vein 9 and the outer edge just before vein 7. The white streak over the tip of vein 7 is very narrow, and its corresponding dorsal streak is indistinct. The

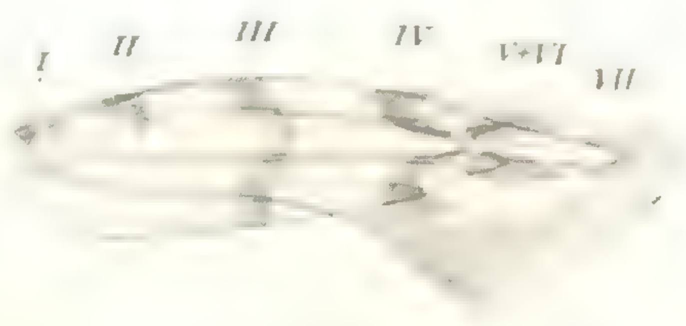

FIG. 21. Early stage in the development of color in the wing of *L. hamadryadella*.

cilia belonging to Band VII are all yellow with a few white scales here and there extending into them. Bands VII, V + VI and IV are somewhat deeper than Band III; Bands I and II are very pale, their paleness being caused by the large admixture of colorless scales at this stage.

In the next specimen examined, apart from a slight deepening of Band III and those beyond it, the only changes observed are the following. The two basal patches on the costa, belonging to Band I, show a slight admixture of brownish tipped white scales. The third patch (Band II) is now faintly continued to the dorsum by a line of scattered yellow scales, and just beyond it, in the position normally occupied by the outer margin of Band II, is an angulated line of very faintly yellow scales. This marks the original outer limit (phylogenetically) of Band II. Just before the tip of vein 1*b* is a similar line of scales running parallel to the dorsal arm of Band III and marking its outer limit. These two lines of scales sometimes do not appear until a much later period in the development. Their time of appearance is largely determined by the number of yellow scales mingled with the dark scales in the adult, since it is only in the yellow scales that the pigment appears early.

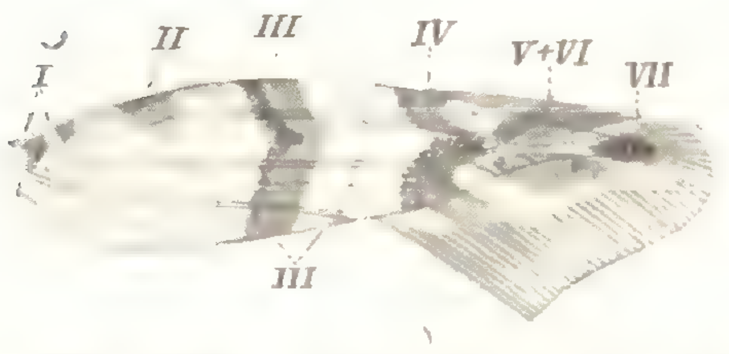

Fig. 22. Later stage in the development of color in the wing of *L. hamadryadella*.

In the next stage studied (*Fig. 22*), Bands I and II in the basal part of the wing remain practically unchanged. Band III is the same in extent, but its color has deepened. Its internal margin is beginning to form, the scales adjacent to the yellow becoming gray tipped. The gray pigment appears directly in the whitish uncolored scales of the previous stage without passing through any of the intermediate steps. In general, the margin is broadest on the costa, becoming narrower and paler below it, and not easily distinguishable toward the dorsum. On its inner edge, the margin is straight or slightly curved as in the imago; on its outer side, the scales project into the angle of the band and fill up the formerly colorless space. The tips of these scales are darker than those of the margin elsewhere. In this specimen, there are only a few scattered yellow scales beyond Band III and no indication whatever of the dark line of scales which is to appear later. The internal margin of Band IV is well marked on its dorsal half, consisting of several rows of dark tipped scales as in the imago. It curves between the two yellow patches, extending to their apices, but not beyond them into the colorless fascia. The costal half of the margin consists only of a few pale gray scales and does not quite reach the dorsal half of the margin. Except for a few very faintly grayish scales above the termen on the inner edge of the dorsal part of Band V + VI, there is no indication whatever of any darkening of scales adjacent to Band V + VI. Belonging to Band VII, and beginning just behind vein 7, the scales covering the entire apex of the wing are gray tipped. Some of them, especially on the costal margin, project over the yellow scales which are to form the line in the middle of the cilia. The gray tipped

scales of the apex, those between the two parts of Band IV and in the angle of Band III, are darker than the other scales forming the margins.

In a specimen at a considerably more advanced stage of development, the scales composing the two patches at the base of the costa are entirely gray tipped and very much the same as they will appear in the adult. The colorless scales mingled with those forming the proximal part of Band II are beginning to be gray tipped; this is especially noticeable on the quadrate part above the upper median vein; below it, there is only a line of a few scattered gray tipped scales reaching to the dorsum. The line of scales beyond, forming the original outer limit to Band II, is pale gray tipped throughout and, though broader on the costa, is complete to the dorsum. The broadening of the internal margin of Band III has continued. Its external margin, separated from the yellow band by white, is indicated by a single line of pale gray tipped scales running from the costa to the cell. The internal margin of Band IV has broadened and deepened and has now probably reached its adult condition. It is not possible to determine whether the development is completed in any single specimen, since there is a great deal of variation in the amount of dusting among the different individuals in this species. In this stage, the scales which in the imago are the most distal of those forming the dark external margin of Band IV are tipped with pale gray and connect with the dusting between the costal and dorsal parts of Band IV. Those on the inner side of the margin which will in a great measure fill up the white space between the margin and the yellow parts of the band are still uncolored. There is a very considerable patch of dusting internal to Band V + VI on the dorsal margin and connected with the apical dusting which has been extended proximally between the parts of V + VI. The costal dusting is not nearly as dark and is somewhat scattered. In addition to the extension of the apical dusting proximally, there has been an increase in the number of dark scales mingled with the cilia. The dark line through the middle of the cilia formed by brown tipped yellow scales is now quite distinct. At this time, most of the dark markings are at least definitely defined in position; there is needed to bring them to their final state only a darkening of those scales already gray tipped and in some places the appearance of pigment in other scales adjacent to these.

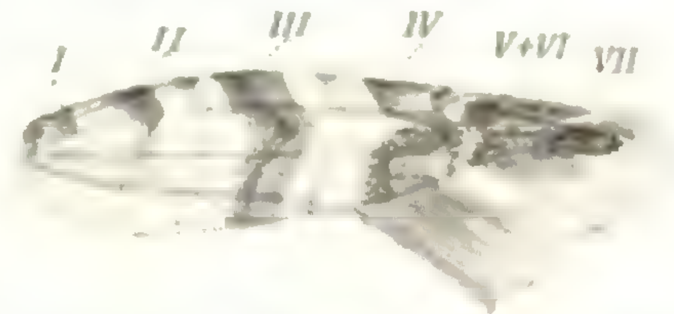

FIG. 23. Wing of *L. hamadryadella* near the end of the pupal state.

In a specimen to be described now, most of these characters have appeared (*Fig. 23*). The patches of dark gray scales at the base of the costa and the line of scales beyond the third of these patches have increased and darkened decidedly. The line of scales external to Band III has now become dark gray tipped. External to Band IV, the dusting has been extended toward the base, so that only a small white streak is left between it and the band on the margins. The dusting in the apex has been much increased and extends along the margin, especially on the costa, and connects with the internal dusting of Band V, thus almost obliterating the white streak over vein 7.

Cremastobombycia ignota F. and B.

In the youngest specimen examined, one in which the ground color was pale yellow, the extent and position of all the adult markings (Fig. 62, Pl. IV) is defined (*Fig. 24*). The paleness is especially marked toward the apex, where it is difficult to distinguish the markings at all. The white fascia is considerably broader than it will appear later. A careful examination shows it to be composed of two parts, an inner fascia which is to form the white fascia of the adult and in which the scales are whiter and are fully formed, and an outer fascia, where the scales are not as large nor as well developed and are somewhat buffish in color. These scales will later form the black scales of the margin. This same thing is true of the other streaks but is not as noticeable except in the case of the first costal because of their more irregular shape. The band between the pair of streaks at three-fourths of the wing length and the streak enclosing the apex is, as shown by its position, equivalent to Band V + VI. The white streak before the apex is situated over the tip of vein 7.

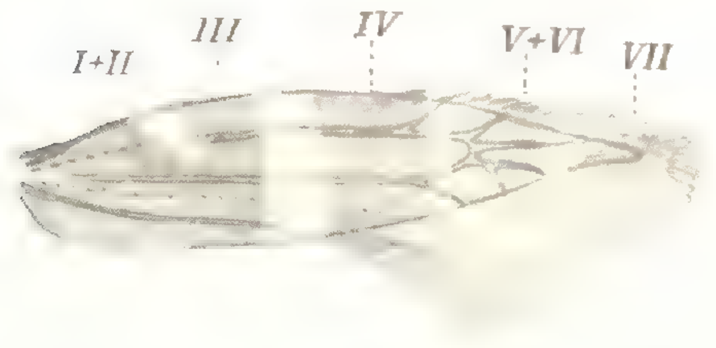

Fig. 24. Early stage in the development of color in the wing of *C. ignota*.

In a later specimen, the ground color has deepened to that of the adult. The scales in the apex and in the cilia remain concolorous with the wing and are not darker at their tips. The dark external margins of the white fascia and streaks are appearing simultaneously, and all are equally advanced. The scales forming them correspond in position with the colorless scales which formed the outer part of the fascia in the preceding stage. The pigment, which is pale gray without a tinge of yellow or brown, is evenly distributed throughout the entire scale from the base to the tip. None of the internal margins has appeared.

In a later stage, the external margins are black as in the adult, and internal margins are present on the costal end of the first white streak and the fascia. There are no internal margins on the pair of streaks at three-fourths. As margins of these streaks are not always present in the imago, it is impossible to determine conclusively whether they normally appear after the internal margins of the fascia and the first streak. However, as will be shown later in the discussion, variable characters tend to appear later in the ontogeny than the fixed characters of a species.

The observations on the development of color in the wings of *C. solidaginis* (Fig. 60, Pl. IV) agree very closely with those on the preceding species. The configuration of the color areas at their first appearance is the same as that of the adult. In this species, however, the scales which are to form the dark margins in the adult are pale yellow instead of, as in *ignota*, being colorless and not fully formed. A comparison with the adult shows that these are dark tipped *yellow* scales, the dark pigment being found at the tip of the scales and not, as in *ignota*, almost uniformly distributed throughout the entire scale.

4. *Discussion and Conclusions.*

In general, I have found that the action of three processes is sufficient to explain the transformation of the seven primitive bands into the several existing patterns of the ground color. These three processes may be stated thus: (*a*) The middle portion of a band may be produced distally until it comes in contact with the band beyond it. (*b*) The extremities of a band may be broadened by being produced proximally. (*c*) The extremities of a band may be narrowed by the retraction of pigment from their outer edges. These three processes may act separately or in combination; the particular pattern produced is the resultant of their combined activity. The first two of these laws are based chiefly upon the changes observed during pupal development, the third law is deduced from adult characters, since the changes are such as cannot be observed directly. The evidence in detail is as follows:

In *L. tiliacella* (*Fig. 7*), seven distinct transverse bands of ground color are laid down; of these, those numbered II, III and IV appear first; following these, Band I, at the base of the wing, appears continuous in the costal half of the wing with II; it is, however, sufficiently separated from it by the difference in time of appearance. The three bands in the apex of the wing appear last and undergo no change; the connection of Band V with IV is brought about entirely by the extension outwardly of IV along the middle of the wing. The changes in Bands II and III are brought about by the spreading of the color onto areas formerly unpigmented; that is, the fascia between II and III is narrowed by the very slight growth *distally* of II along the *middle* of the wing, its extremities remaining fixed, and by the extension *proximally* of III, chiefly along the margins. Band IV reaches its adult configuration earliest; it is also the earliest to acquire the black pigment on its outer edge. This does not appear in the middle of the wing, where the band has extended outwardly uniting with V. The outer edges of the extremities of Band III have remained constant in position, and the dark scales appear first here. In Band II, there has been the least change in shape; the deepening of the pigment along its outer edge occurs more uniformly. From this, it follows that *while the general tendency is for dark pigment to develop along the outer edges of bands adjacent to unpigmented areas, the precise time of its appearance along any band or portion of a band in relation to other bands or portions of the same band is determined by the time when such bands or portions of bands reach their adult shape and color. The outer edge of a band in direct contact with another band acquires no dark pigment.* It would appear from the observations on this species that *the bands in their primitive condition are narrower than they are in the adult. A fascia may be narrowed by the uniform spreading of a band toward the base.*

These conclusions are corroborated by the observations on *L. tritænianella* (Fig. 5, Pl. III); all the bands, however, appear simultaneously, and at this time all are straight. There is, however, a reduction in the apparent number of bands, V and VI being completely united. Band IV seems no further advanced than

the others toward the adult condition; as in *tiliacella*, development must take place more rapidly, since its margins reach their adult condition before those of the other bands. Here, also, is the first manifestation of that tendency, so characteristic of all the more highly differentiated species of the genus, toward the darkening of scales in the apex. In this species, these scales are scattered over the entire apex, instead of being limited to a definitely defined area where the scales are modified structurally. This species does not, at any stage, show the primitive type of marking; a considerable amount of development is, however, necessary before the color areas attain their definitive final extent.

In *L. cratægella* (Fig. 36, Pl. III), *ostryæfoliella* (Fig. 23, Pl. III), *lucidicostella* (Fig. 44, Pl. III), *hageni* (Fig. 17, Pl. III) and *morrisella* (Fig. 48, Pl. III), in the basal half of the wing, where in the adult there is the greatest divergence from a transversely banded type of marking, the color areas, upon the first appearance of a uniform pale yellowish, have almost exactly the same shape and extent as in the adult. They undergo very little change during development, except that in these species, as well as in *tiliacella* and *tritænianella*, there is a progressive and gradual deepening of the ground color. In the youngest specimens of *ostryæfoliella* observed (*Fig. 14*), the first pair of streaks are still connected; very soon, however, they become separated by the union of Band III with IV.

In the apical half of the wing, Bands V, VI and VII appear as straight transverse bands (except in *morrisella*); the transformation of the unpigmented fasciæ between them and between IV and V into pairs of opposite streaks is brought about by the outward extension of Bands IV, V and VI along the cell in a manner similar to that previously observed for Band IV in *tiliacella* and *tritænianella*. The obliteration of a white streak is brought about by the inward extension of the extremity of a band to meet the outer edge of the preceding band. In *morrisella*, the pattern is predetermined from the outset, the white fascia and streaks being produced by structurally modified scales, which are destined never to acquire pigment.

There are no reasons favoring the view that such a type of marking as that found in *cratægella* (Fig. 36, Pl. III) is primitive: there are many reasons for regarding it as having been produced through a long process of evolution. It is a matter of general observation that the pale colors appear first ontogenetically, black of the pigmental colors being last to appear; it has been inferred that the same is true also for the phylogeny. In the adults of these species, there have developed, in addition to the usual dark markings adjacent to the unpigmented areas, definitely limited black spots and streaks in the apex. The scales thus pigmented are also differentiated structurally from the surrounding scales by their smaller size. There is no such structural modification of the dark tipped scales in the apex of *tritænianella*. Obviously a considerable period of time must have been required for the final differentiation of such characters as these. That these species have undergone an extensive process of differentiation in the production of certain characters of a kind which can only be acquired late in

racial development, renders it highly probable that there has also been a far-reaching modification from the ancestral condition of the extent of the color areas. These phylogenetic changes are scarcely or not at all repeated in the ontogeny. Three primitive bands are still preserved during the early stages in the apex of the wing; the band proximal to these shows unmistakable signs of its origin from a straight transverse band, its outer edge being straight. We may, therefore, with reasonable certainty, conclude that the color pattern of the basal part of the wing may be traced back through a series of phyletic changes to its origin from the first three primitive bands.

The ontogeny offers no direct testimony of the means by which these results have been accomplished; it has given, however, visible evidence of two actual dynamic methods by which changes have been wrought; namely, *the middle portion of each band may be produced distally until it comes in contact with the band beyond it; the extremities of a band may be broadened by being produced proximally.* Thus are produced, first, angulated fasciæ; second, slightly oblique pairs of opposite streaks; the final effect of the second of the above processes, if acting alone, is the entire obliteration of the white streaks. That a third process has been at work is indicated by observations upon adult forms. The dorsal of the first pair of white streaks in *L. cratægella* (Fig. 36, Pl. III) does not occupy its primitive position over vein 1*b* but has been displaced toward the base, and vein 1*b* reaches the margin within Band IV; that is, there has been an extension of the extremity of Band IV in this direction over the area formerly white. But since a white streak still remains, there must have been a compensating drawing away of the outer edge of Band III at its extremity. Such a withdrawal of pigment cannot, of course, be observed ontogenetically. A third dynamic process in the transformation may, therefore, be stated thus: *the extremities of a band may be narrowed by the retraction of pigment from their outer edges.* This is an example of the shrinking away of a band at one end. In this case, the shrinking takes place at the *outer* edge of the band only. The result of the combined action of the second and third of these processes is the progressive movement of the end of the band toward the base.

These three processes are sufficient to explain the origin of all the types of marking in this genus; the specific results in any case are due to the manner and extent of their action; that is, whether they act singly or together and to the relative rapidity of action of the three processes. How they have combined to produce these various types will be discussed in detail under the heading of phylogenetic development.

In the second division of the genus, the extent of the areas of ground color undergoes very little change during development. The ground color appears in the earliest stages over those areas which in the adult are occupied by *yellow* or *reddish yellow* scales or by dark tipped *yellow* scales. The scales, which in the adult are white with dark brown, gray or black tips, do not receive pigment until much later; they then pass directly to gray or brownish gray and thence to

black, without passing through the intermediate yellowish and brownish shades. The tendency for dark pigment to develop along the edges of bands adjacent to unpigmented areas is exemplified in this group also, with this difference, however, that it appears first along the *inner* edge of a band. When dark pigment develops in addition along the outer edge, it appears at a later period. The converse is true in the first division of the genus; the dark margin appears earlier on the *outer* side of a band. I can offer no explanation of the original cause of the difference in direction of development; the result in either case seems to be the expression of the same general tendency in development, acting, however, with different degrees of intensity on either side of a band. It would seem that the development of unusually dark pigment on one side of a band—the acceleration of chemical processes over a localized area—retards development on the other side.

The ontogeny within this division affords very little evidence of the operation of the first two processes of evolution defined earlier in this discussion. However, the shape of the bands and the separation of the white fasciæ into opposite spots, with the total obliteration of some of the spots, is sufficient proof that these forces have acted during the evolution of the species.

L. hamadryadella (Fig. 77, Pl. IV) alone, of those observed, shows the outward prolongation of the middle of a band; the gradual extension distally of the dark dusting between the dorsal and costal portions of Band V + VI and its final contact with the apical dusting (*Figs. 22, 23*) is an example of the working of this law. The third law postulated to explain the displacement of oblique streaks toward the base receives decisive confirmation from the adult markings of the same species. A narrow line of scales crosses the wing beyond the yellow portions of each of Bands II, III and IV, being separated from them by white. These scales occupy positions corresponding to the outer margins of these bands; ontogenetically, the dark pigment develops in them after it has appeared on the inner margins of these bands. The conclusion is apparent that these lines of scales mark the earlier phylogenetic limits of these bands. The bands have shrunk away, most rapidly on the costa and dorsum, leaving behind them the margins as visible evidences of the process.

In *L. tiliacella* (*Fig. 7*), which, from its conservation of the greatest number of bands in a primitive straight condition, the very pale ground color and the entire absence of any dark scales in some of the bands, may be regarded as the most primitive of the American species, there is a difference in the time of appearance of the bands. In the more advanced species, the bands appear at the same time. Evidently, then, in the higher species, there is a hastening and crowding together of the earlier stages, so that the bands which formerly appeared in sequence now appear contemporaneously. Those in the apex of the wing, which have experienced the least modification during the phylogenetic development of the species, alone recapitulate the racial history during their ontogenetic development.

The discussion heretofore has dealt chiefly with the processes which effect the final limitation and configuration of the *ground color*. The general tendency toward the production of dark pigment in rows of scales adjacent to unpigmented areas has also been noted. These streaks of dark scales, which are usually transverse, and the various other characteristics, such as the apical spot, the longitudinal streak of black scales in the apex and the black streak in the fold, properly constitute the *markings*, in distinction to the ground color, and are superimposed upon it. While the progressive change in the configuration of the ground color is the important factor in determining the *general evolution* of the *genus* and the different stages at which development has halted form the *starting points* for the differentiation of the different *groups* of species, the development of the markings is the important factor in determining the phylogenetic sequence of the *individual species* within each group. A knowledge of their mode of origin and relative time of appearance is therefore essential.

In *L. tiliacella* and *tritænianella*, it was seen that the dark margin develops first along the edge of Band IV, which is the first band to reach its adult shape. In *L. tiliacella*, the outer edge of this band has become fixed before all of the bands have even been laid down. The dark margin appears toward the costa and dorsum, in places where the outer edges of the band have undergone no change whatever since the first appearance of color. The dorsal margin seems to be in advance of the costal. There is no darkening of pigment along the bands in the apex, which appear comparatively late. From these observations, it appears that *in the ontogeny, the dark margin develops earliest along the edge of that band which first reaches its definitive adult condition. Before dark margins can develop, the edge of a band must have remained fixed for an appreciable period of time.*

In *L. cratægella, ostryæfoliella* and *lucidicostella*, the dark margin on Band IV is also the first to appear. The apparent contradiction to the principle just laid down that a dark margin develops earliest along the edge of the band that has first reached its definitive adult condition, lies in the fact that in these species the color areas in the basal half of the wing are at the outset defined almost as in the adult, while the bands in the apex repeat the racial development. It might be expected, then, that the margin would appear earliest along the first pair of streaks. It has, however, required a much longer time in the *evolution of the species* for the basal half of the wing than for the apical half of the wing to acquire its present aspect; the development in the apical half has come to a standstill comparatively early in the phylogenetic history of the species. The observed recapitulation in the apical three or four bands during the ontogenetic development of the steps in the racial differentiation of the species is in harmony with the conclusions of other investigators that it is only among primitive forms that anything approaching a complete repetition of phylogenetic changes is to be found in the ontogeny.

The apex of the wing (in respect to the conservation of primitive color areas) may be regarded as primitive in comparison to the base of the wing. In

the phylogenetic development of this type of marking, therefore, it is possible that the margins appeared on Band IV while the basal half of the wing was still under the influence of dynamic forces producing constant changes in the outlines of the areas of ground color. No margins could have appeared in the basal half of the wing until after these outlines had become permanent. Some of these changes, as has been already shown, are such as cannot be repeated during pupal development. Hence the color areas in the basal half of the wing tend to be laid down in their final shape. *The sequence of the appearance of dark markings, which are in reality a second series of transverse bands superimposed upon an earlier set, follows the same order for the ontogeny as for the phylogeny; that is, in this second and more recent set of characters, there is an actual recapitulation.* The margins of Bands V and VI appear later, corresponding, therefore, to the sequence in the time of appearance of these bands phylogenetically, hypothetically based upon that of *L. tiliacella.* The margin on the upper side of the basal streak corresponds in time to the outer margins of the bands; it appears before inner margins develop. An *outer* margin of a band tends to appear first near the *costa* or *dorsum*, an *inner* margin near the *middle* of the wing; that is, at the apex of the outer side of a white streak, these being the parts of the edges of the bands which have reached their permanent position earliest. Therefore, *the relative time of appearance of the dark margin of any band in the ontogeny is dependent upon the time when the edge of that band became fixed in the phylogeny.*

In *L. morrisella* (Fig. 48, Pl. III), margins are formed almost simultaneously on either side of the white streaks by a direct change to gray and thence to black. The pigment in the other black scales develops in a similar manner without passing through the usual intermediate stages. The gray and black pigments make their first appearance at an early stage, while the ground color is still pale yellow. The structural differentiation of the white scales, the massing of black scales in the dorsal half of the wing, the exceedingly large apical spot and the black longitudinal streak in the fold all indicate the very high phylogenetic position of this species. Upon the addition of these newer characters, the earlier ones were crowded closer together and pushed farther back into the ontogeny, resulting in their contemporaneous development.

In the species of the second division of the genus, dark margins develop in conformity with the principles already enunciated. There are certain minor differences between this and the preceding division attendant upon the original unexplained diversity in the inherent tendencies of the two divisions. The dark margin appears first on Band IV in the middle of its inner edge, in contrast to its appearance in the other division on the outer side and near each end of this band; the same is true for Band III. This is a necessary consequence of the action of the three general processes of evolution; *the middle of the inner edge of any band remains stationary, and hence a margin will develop here earlier than at the extremities of the band.*

In *Cremastobombycia ignota* (Fig. 62, Pl. IV), the development is very similar

to that of the species of the "flat-larval group." The margins appear almost simultaneously, the scales changing directly from colorless to gray and thence to black. These scales, at the time the yellow ground color spreads over the wing, are not fully formed, thus contrasting with the similarly unpigmented, but fully developed scales belonging to the white fascia and streaks. In all other species examined, the scales were all equally and fully formed at the time of the first appearance of pigment in any part of the wing.

In many species, these dark streaks adjacent to white are the only defined dark markings present; there may be a few scattered, darker tipped scales in the apex. An increase in the amount of dark pigment producing additional dark markings manifests itself in either of two ways. (1) The *number* of scales thus affected may be increased, so that the actual extent of the wing occupied by dark tipped scales is greater. This is the direction that evolution has taken in the species of the "flat-larval group" (illustrated on Plate IV) and in a few of the species of the "cylindrical-larval group" (*e. g.*, *celtisella*, Fig. 56, Pl. III, and *celtifoliella*, Fig. 4, Pl. III). Often, among the more highly differentiated of the species of the "flat-larval group," the entire apex of the wing is covered with black tipped scales (*e. g.*, *agrifoliella*, Fig. 79, Pl. IV). Similar areas may develop in other parts of the wing; thus a patch of dark tipped scales may extend outwards from the angle of a fascia (*e. g.*, *bethunella*, Fig. 84, Pl. IV). (2) There may be a *concentration* of pigment in comparatively few scales, which with increasing differentiation tend to be segregated in definitely limited areas marked out by structural modifications of the scales (*e. g.*, *lucidicostella*, Fig. 44, Pl. III, and *cratægella*, Fig. 36, Pl. III). In these cases, the scales are pigmented almost to their bases, not merely dark tipped. With the single exception of *obstrictella* (Fig. 64, Pl. IV) among the species of the second division of the genus, this tendency is confined to the species of the "cylindrical-larval group," where it manifests itself in the apex either as an apical dot or as a somewhat elongate or irregular patch of scales, broadest just before the tip of the wing. A similar longitudinal streak of black scales is present in the fold in *robiniella* (Fig. 50, Pl. III), *uhlerella* (Fig. 49, Pl. III), and *morrisella* (Fig. 48, Pl. III).

Finally, there may be a decided deepening of the ground color itself between the white streaks. This process has reached its highest development in *robiniella*, *uhlerella*, and *morrisella*.

In the ontogeny, the development of all of these specializations has been much abridged, and concomitant with this, their time of appearance has been pushed back farther and farther into the earlier stages of pupal development. The dark tipped scales remain colorless during the time the yellow scales are attaining their adult condition; later, they change directly to gray and black. The pigment in the areas of dark tipped scales in the apex and beyond the fasciæ often appears simultaneously with that of the margins. Some variation is to be noticed here; in *L. bethunella*, the gray pigment appears in all the scales beyond the fascia, simultaneously with the *beginning* of the formation of the dark

margin; in *L. caryæfoliella,* the dark margin of the fascia is *complete* before any pigment has developed in the area beyond it. In the imago, the patch of dusting beyond the fascia is an established constant character in *bethunella;* in *caryæfoliella,* the amount of such dusting is very variable, indicating its recent appearance in the species.

It would seem then that *only those characters permanently established and of long standing in a species exhibit this precocity of development; recently acquired or variable characters appear ontogenetically in the order of their phylogenetic sequence.*

This conclusion is confirmed by observations upon the mode of development ontogenetically of other analogous dark markings. Comparison of imagoes indicates that the apical spot and the black patch in the apex have originated phylogenetically earlier than the streak of brown scales along the middle of the wing but later than the dark internal margins of the white fasciæ and streaks. In *L. cratægella,* the pigment in the scales of the black patch before the apex, which is unquestionably a characteristic only acquired through differentiation extending over a long period of time, appears earlier than that in the brown scales extending along the middle of the wing and reaches its definitive adult condition while the latter are still wholly unpigmented. In *L. hageni* also, the apical spot appears sooner than the dark scales in the middle of the wing beyond the tip of the first dorsal streak.

Such specializations as these cannot, however, have originated very early in the evolution of a species, and the observed phenomenon of their unduly precocious appearance and rapid development in the ontogeny requires additional explanation. In *L. cratægella, ostryæfoliella, lucidicostella, hageni* and *morrisella,* these were the first dark markings to appear. The first tinge of gray appeared before the ground color itself had reached its adult shade or rarely even before it had reached its adult configuration. It is possible that physiological causes act directly toward this end. In the racial development, the segregation of black scales over a limited area and the later modification of these scales structurally has been accomplished gradually; the results have become permanent in the species, and the scales, when first formed before any pigment has entered them, have a structure identical with that acquired late in phylogenetic development. It is suggested, in explanation of the phenomenon of the early appearance of black pigment in them, that the concentration of pigment-forming substances within a smaller space—the interior of these smaller scales—results in a more intense chemical action over a localized area and thus hastens development.

The general conclusions which have been drawn from the study of pupal development may be summarized as follows:

1. The primitive type of color pattern consists of a series of seven transverse bands, which, except the first, cross the wing perpendicular to the costal margin and are not wider than the unpigmented fasciæ between them. Their positions are determined by the course of the longitudinal nervures.

2. In the evolution of the genus, changes in extent alone of bands are

brought about by the uniform spreading of the pigment toward the base, the edges of the bands remaining straight. Changes in the extent and form of these bands have taken place through the action of any or all of the three following dynamic processes: (*a*) The middle portion of a band may be produced distally until it comes in contact with the band beyond it. (*b*) The extremities of a band may be broadened by being produced proximally. (*c*) The extremities of a band may be narrowed by the retraction of pigment from their outer edges. The action of the first two may be observed directly, the third is an inference from a comparison of adult markings.

3. The bands, either in their primitive shape or as modified through the course of evolution, constitute the ground color upon which a second darker series of transverse characters is superimposed. These are properly termed the markings and appear at the limits between ground color and unpigmented areas. Their relative time of appearance, ontogenetically, is dependent upon the time when that portion of the edge of a band has become fixed phylogenetically.

4. Later in the phylogenetic history, spots and longitudinal black markings may appear. For reasons not fully understood, certain of these markings appear earliest in the ontogeny.

5. Recapitulation in the ontogeny is at most only partial and is confined to those species or to those parts of the wings in which there has been the least advance from a primitive condition. Here also a distinction must be made between ground color and markings.

(*e*) Phylogenetic Development of the Color Pattern.

From the previous discussion, it was seen that a few definite processes, identical in all of the species, have acted to produce modifications in the extent and configuration of the areas of ground color. Later, a set of darker transverse markings has been superimposed upon the ground color. The dark pigment appears in rows of scales contiguous to unpigmented areas. There are two possibilities in regard to the place of its first appearance, namely, the outer or the inner edge of a band.

While the evolution of the pattern of the *ground color* has taken place in the same directions in both divisions and in the two subgenera of the genus, the development of the dark markings has followed different directions. In the division whose larvæ are of the ordinary cylindrical type and in *Porphyrosela*, the dark markings appeared first on the outer edges of the bands; in the division whose larvæ are of the modified flat type and in *Cremastobombycia*, the margins appeared first on the inner edges of the bands.

Two different inherent tendencies in development are therefore exhibited. These two lines of development must have diverged early in the phylogeny, while the only color pattern was still that blocked out on the white wing by the shape of the areas of ground color and before any of the dark markings had appeared, since neither type of marking can be derived from the other, and the

species of the first division are more closely related among themselves than to any of the species of the second division or of *Cremastobombycia*.

An ancestral form, more primitive in respect to generic structure as well as color pattern and transversely marked with seven bands of a uniform pale yellowish color, has evidently given rise first to a series of species in which dark margins have developed earliest on the outer edges of bands—in this case, the white streaks and fasciæ are said to be internally dark margined. Later, or perhaps contemporaneously, in another species of the same ancestral strain, the opposite tendency has developed, and there has been evolved a series of species in which dark margins appear earliest on the inner edges of the bands—in this case, the white streaks and fasciæ are said to be externally dark margined. A few of these latter species, constituting the subgenus *Cremastobombycia*, have retained a more primitive generic structure; the remainder have followed the same course of evolution structurally as the species of the first division of the genus. It is, of course, possible that this second tendency originated twice and independently.

Several factors combine to render it probable that *Cremastobombycia* (in its modern form) and the "flat-larval group" originated at a somewhat later period than the typical *Lithocolletis* (*Fig. 26*). The restricted geographical range of the "flat-larval group" and of *Cremastobombycia*, which with one exception are confined to America, indicates their comparatively recent origin. Considerations based upon larval characters confirm this view. The later larval stages of the typical *Lithocolletis* are identical with those of *Gracilaria*, which is without question accepted as the ancestor of all these groups. The corresponding stages in the larva of *Cremastobombycia* have a more flattened and triangular-shaped head, without, however, the structural modifications which have developed in the "flat-larval group." It may be concluded, then, with reasonable certainty, that after the origin of the typical *Lithocolletis*, the species of the ancestral stock retained for a short period their imaginal structure. During this time, changes in the larval form were initiated. In the ancestral form of *Cremastobombycia*, development along this line did not progress far, and the larvæ have preserved the normal mode of feeding; hence there has been no attendant structural modification.

Cremastobombycia may have originated after a certain amount of evolution in the color pattern had already taken place; this view is supported by the observation that none of its species conserves as primitive a type of marking as is to be found in several species of the "flat-larval group."

We may conclude, therefore, that the immediate ancestor of all the groups under discussion was of a somewhat more primitive structure than *Cremastobombycia* as we now know it. The structural relations of the four groups with reference to the ancestral stem are illustrated diagrammatically by *Fig. 25*; the relative time of origin of each by *Fig. 26*. The similarity of the color pattern of the species of *Cremastobombycia* to that of some of the species of the second

division of the genus does not in any way indicate that this is primitive; it has rather been produced independently in the two groups, by the action of the same three fundamental factors.

The phylogenetic tree thus shows two main stems extending in different directions from a common origin. By the application of the three general principles directing the evolution of the pattern of the ground color, it is possible

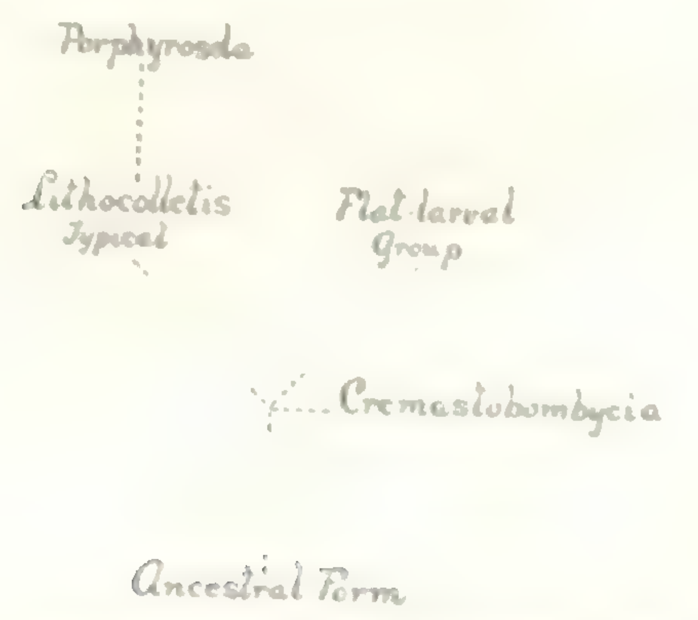

FIG. 25. Phylogenetic tree showing structural relationships of the groups of *Lithocolletis*.

FIG. 26. Phylogenetic tree showing relative time of origin of the groups of *Lithocolletis*.

to retrace the steps in the origin of the different groups of species. The evolution of the species of the "cylindrical-larval group," which will be discussed first, is illustrated on Plate III.

In all of the species except *bataviella* (Fig. 58), there has been a fusion of Bands I and II along the costa.

If evolution in the shape of Bands II and III has been in the same direction and at the same rate, and the outward growth of the middle of each has not been sufficient to bring it in contact with the band following, and this outward growth has been compensated for by an equal growth toward the base of the extremities of Bands III and IV, species characterized by two entire fasciæ will be produced, the first at the basal fourth, the second at the middle of the wing.

Where evolution ceases early, all or most of the bands may be preserved as transverse bands. *L. tiliacella* (Fig. 1) has been differentiated as a species when, except for the fusion of I and II on the costa, Band IV alone had come in contact with the band beyond. Specific differentiation, that is, the production of dark margins, etc., has also halted soon, as we observe that no dark scales are present on the last three bands. If development along the same line proceeds farther, and by the farther outward growth of the middles of Bands II and III and the extension inwardly of the extremities of III and IV, the fasciæ between them become distinctly bent, the pattern of the ground color resembles that of *oregonensis*. There has also been an accompanying gradual deepening of the ground color. Specific differentiation at this level over a long period, as evidenced by the black apical spot, has given rise to *oregonensis* (Fig. 2). If, on the other hand, evolution of the first three bands stops at the level of *tiliacella* but continues in the apical four bands until IV, V, VI and VII are continuous along the middle of the wing, species of the type of the European *L. nicellii* will be produced.

If the bands continue to become more and more bent outwardly and the fasciæ between them gradually narrowed, forms of the type of *fragilella* (Fig. 3) will be produced. If now the action of the third law comes into play, the outer edges of the bands on the margins will move toward the base; if the extremities of the bands are extended toward the base at the same rate, very acutely angled fasciæ will result, as in *celtifoliella* (Fig. 4).

If the extension of the ground color toward the base in Band VI has taken place rapidly, there is an entire obliteration of white between V and VI, which then form a single uniformly colored band. In *tritænianella* (Fig. 5), *affinis* (Fig. 6) and *ostensackenella* (Fig. 7), this has occurred, Bands II, III and IV remaining nearly straight. In *mariæella* (Fig. 8), these bands have become bent outwardly. In *ostensackenella*, while the bands have remained straight, there has been a very decided advance and specialization in other directions; namely, in the structural modification of the scales forming the fasciæ and spots and in the darkening of the base of the wing into a deep brown except near the base of the dorsum. There has also been considerable modification in the larva, which has become more flattened and in which the sides of the segments project more prominently than usual. It also deviates from the typical habits of the genus in that it leaves the mine to pupate.

We may regard *Porphyrosela* as having originated from an ancestor with this type of marking. The recent origin of the species within it (Fig. 9) is indicated by the deep ground color, dark margins on either side of the white fasciæ and the structural modification of the white and the purple scales.

If the extension distally of each of the bands along the cell has continued until it has reached the band beyond and the inner extremities of the bands have been produced basally at a slower rate, the result is the production of pairs of opposite white streaks.

In *auronitens* (Fig. 10), it is probable that the fasciæ were considerably narrowed before these processes began, thus accounting for the almost perpendicular position of the white streaks.

In the remaining groups of species, these processes began early and the pairs of streaks are more or less oblique. There is first produced a form in which the ground color is blocked out as in *argentinotella* (Fig. 11). *Occitanica* (Fig. 12) is derived from *argentinotella* by the obliteration of the first, fourth and fifth costal streaks.

If now a movement of the extremities of each band toward the base is accompanied by a corresponding extension of the extremities of the band beyond it toward the base, very oblique white streaks result. Where these movements have taken place at an approximately equal rate in all of the bands, forms such as *leucothorax* (Fig. 13) will be produced. The outer edge of Band II on the costa has been retracted completely to the base so that the first white costal streak begins at the base. This species furnishes further evidence of the long continuance of evolution by the well developed apical spot.

If on the dorsal margin, the retraction of pigment from the outer edge of Band III takes place more rapidly than the extension proximally of the extremity of that band, its dorsal portion will disappear, and the second white dorsal streak will coalesce with the first; *fitchella* (Fig. 14) typifies this result. The extension of color onto a white streak has probably taken place most rapidly just within the dorsal margin; the evidence for this conclusion rests upon the observed concavity of the outer edges of the white streaks and their greater width on the margin.

If the most rapid movement, as is usually the case, has been that of the outer edge of Band II toward the base, the first result will be the union of the upper inner edge of the first white dorsal streak with the short oblique streak at the base separating Bands I and II. A small streak of ground color will be left between them on the dorsum; this soon becomes a small spot removed from the dorsal margin by the more rapid shrinking away of Band II on the margin. *Salicifoliella* (Fig. 15) and *tremuloidiella* (Fig. 16) have been differentiated as species at this level.

The small spot of ground color just referred to becomes smaller and smaller and finally disappears. The base of the dorsal margin is then occupied by a white patch whose outer edge is the inner edge of Band III. Differentiation at this stage has given rise to *hageni* (Fig. 17), *arbutusella* (Fig. 18) and *insignis* (one variety) (Fig. 19). In *hageni* and *insignis*, the first white costal streak has disappeared entirely. Following closely behind the retraction of pigment from the outer edge of Band II on the costa, the extremity of Band III has been produced along the costa to the base; phylogenetically then, this is the second time pigment has appeared along the base of the costa. In *arbutusella* (Fig. 17) the first costal streak has been involved in a change similar to that of the first dorsal with which it has united. In these three species equally distinct dark margins have appeared on either side of the white streaks, and there has been a very decided darkening of the scales of the ground color between the streaks, indicating that after the general phylogenetic evolution of the pattern of the ground color had come to a standstill, specific differentiation proceeded rapidly and for a considerable period of time. In the other variety of *insignis* (Fig. 20), Band III in its dorsal half has been produced to the base, most rapidly just above the dorsum, leaving a white median basal streak and a white spot on the dorsum near the base. This then is the method by which a median long basal streak has originated; its basal part is therefore homologous with the white streak separating Bands I and II; its apical half is homologous with a part of the white streak separating the dorsal portions of Bands II and III.

Where the extension of Band III to the base has followed immediately on the progressive withdrawal of pigment from the outer edge of Band II, without the intervening cessation in development found in *insignis*, the configuration of the color areas is that of the group of species of which *obscuricostella* (Fig. 25) and *cratægella* (Fig. 36) are typical examples. In most of the species of this

group, there has also been a retraction of pigment from the outer edge of Band III, and at the same time, the extremities of Band IV have been produced toward the base so that the first pair of white streaks are very oblique and are situated before the tip of vein 1*b* which in more primitive forms determines the position of these white marks. The obliteration of the first white costal streak has not been attained in all the forms which reached this level before evolution in the pattern of the ground color halted and species differentiation began, since it is preserved in some species and lost in others.

Within this group the development of the dark markings in the apex has taken two different directions; the black marking in the apex may take the form of a round apical dot, or of a streak or patch of black scales of variable shape. Of the species with apical dots, *caryæalbella* (Fig. 21) lags somewhat behind the other species; the suffusion of the base of the wing with pale yellow is not yet complete, but the first costal streak has been lost. Development has been more rapid toward the costa than in the dorsal half of the wing; the converse is true for *rileyella* (Fig. 22) where the first white costal streak remains. In conformity with the principle that within a group a darker ground color and the presence of dark markings indicate a higher phylogenetic position, the sequence of the remaining species with an apical dot will be *ostryæfoliella* (Fig. 23), *olivæformis* (Fig. 24), *obscuricostella* (Fig. 25) and *kearfottella* (Fig. 26). In the last two species all trace of a white spot near the base of the dorsum has vanished.

Of the species characterized by more or less irregular patches of black scales in the apex, *populiella* (Fig. 27) is probably the most primitive from the point of view both of color areas and markings. Among several of the species, namely, *diaphanella* (Fig. 28), *salicivorella* (Fig. 29), *deceptusella* (Fig. 30), *alni* (Fig. 31) and *alnicolella* (Fig. 32), the pair of streaks in the middle of the wing are not very oblique, that is, there has been a more restricted action of the last two of the three processes of evolution than is observed in the five following species. In *ledella* (Fig. 33), *incanella* (Fig. 34), *scudderella* (Fig. 35), *cratægella* (Fig. 36), *malimalifoliella* (Fig. 37) and *propinquinella* (Fig. 38), these streaks are very oblique.

If evolution of the pattern of the ground color, instead of halting at the level of the preceding group of species, proceeds farther, it takes place in two directions.

1. The base of the wing may be uniformly suffused with ground color, so that no white streaks remain when evolution ceases, and therefore no dark markings develop. The configuration of the ground color in the remainder of the wing has remained constant during these changes. This is the condition of affairs in *sexnotella* (Fig. 39), *æriferella* (Fig. 40) and *obsoleta* (Fig. 41). In *obsoleta* the pattern remained fixed for a short time, and the development of dark pigment in the scales adjacent to the white streaks was initiated, then the extension of all the bands toward the base was resumed, checking further develop-

ment of dark pigment. The result is a tendency toward a uniform distribution of ground color over the entire wing.

It may be objected that the color pattern of the three species just discussed could have been derived directly and in a more simple manner from that of *L. argentinotella* (Fig. 11) by the broadening of the extremities of Bands II and III toward the base, resulting in the obliteration of the white streaks separating Band I from II and Band II from III. On this hypothesis the greater changes have occurred in the middle of the wing since the oblique pair of streaks in the middle of the wing have been produced by the combined action of the second and third processes of evolution. This is not in agreement with the facts observed up to this stage in the evolution of the color pattern, namely, that the greatest changes have occurred near the base of the wing, nor with the general principle that development is more rapid in the more proximal parts of an organism.

2. The shrinking away of the ground color at the extremities of the bands may continue and the outer edges of Band III may be involved to a greater extent than hitherto observed. In *albanotella* (Fig. 42) evolution in this direction has ceased comparatively early, the darker ground color and heavier dark margins indicating the longer time occupied in specific differentiation. In *argentifimbriella* (Fig. 43) the withdrawal of color from the base of the wing has been almost complete and there has been no later extension of color toward the base from Band IV. In *lucidicostella* (Fig. 44) there is a slight extension of color along the dorsal margin; the halting in development has been too recent for a dark line of scales to develop on the streak of ground color extending along the upper side of the cell. In *clemensella* (Fig. 45) this streak has also disappeared. In the four preceding species, evolution has taken place more rapidly on the dorsal than on the costal margin of the wing. In *quercialbella* (Fig. 46) and *trinotella* (Fig. 47) the costal half of Band III has also shrunk away; the only transverse bands then remaining are the four apical ones. In the European fauna, the final consummation of this process is witnessed in such species as *L. cramerella* and *L. tenella*. Development has halted at different levels, as in our species, and dark streaks have appeared at the edges of the bands. Gradually then bands more and more distal have shrunk away, leaving behind them the dark fuscous streaks on an almost white ground.

In all of the groups whose evolution has been traced, modification in the shape of Bands II and III, in the early phases of evolution has progressed in the same direction and at approximately equal rates, so that the bands are of similar shape (cf. *argentinotella*, Fig. 11).

In the following species evolution has proceeded independently in each of these bands.

Changes may proceed very slowly on the inner edge of Band IV and outer edge of Band III; the tendency is then toward the preservation of a median

white fascia. If the outward growth of Band II along the cell is comparatively rapid, a pair of opposite streaks will be produced at the basal fourth. These changes have taken place very early in the phylogenetic history, and if evolution of the pattern of the ground color ceases here, species of the type of *morrisella* (Fig. 48), *uhlerella* (Fig. 49) and *robiniella* (Fig. 50) will develop. The laws governing specific differentiation have had an opportunity to operate over a long period of time, and very highly specialized individual characters have developed. In *robiniella* evolution of the pattern did not cease quite as soon as in the other two species, the fascia has been narrowly separated into two streaks and all of the streaks have become more oblique. In consequence of the later beginning of specific differentiation, the individual characters are not as highly specialized as in *uhlerella* and *morrisella*.

If the edges of the first pair of streaks move toward the base, and there is no corresponding extension of the extremities of Band III toward the base, species of the type of *lucetiella* (Fig. 51) will be produced.

Where Band III has been extended to the base, there is a basal streak very similar to that of *cratægella* (Fig. 36) and the other species of that group. *Martiella* (Fig. 52), *gemmea* (Fig. 53) and *symphoricarpella* (Fig. 54) have originated thus. In *symphoricarpella* the basal streak is very small—the ground color has shortened and narrowed it.

If the outer edge of Band III instead of remaining straight has grown distally along the cell and at the same time the movement of its extremities toward the base has been accompanied by a compensating extension of the extremities of Band IV toward the base, angulated fasciæ will result; *apicinigrella* (Figs. 55*a*, 55*b*) and *celtisella* (Fig. 56) have been thus differentiated. Finally this angulated fascia may become very acutely angled through the shrinking away of Band III and the white may be extended along the margins to the base of the wing. At this stage a very slight outward growth of the middle of Band III will divide the fascia into very oblique streaks; *basistrigella* (Fig. 57) has been thus produced. In this species the separation of a white fascia into a pair of streaks was the last step in evolution; in the other species characterized by opposite streaks, this process has been one of the earliest events in evolution.

Bataviella (Fig. 58) is an early isolated offshoot from the main stem; it alone of all the species has preserved, in some of its varieties, Band I at the base of the wing distinctly separate from II. Specific differentiation has extended over a length of time sufficient for all of the scales of the ground color to become dark tipped.

The second main stem of the phylogenetic tree, which has given rise to *Cremastobombycia* and the "flat-larval group," is illustrated on Plate IV.

The species of *Cremastobombycia* and of the "flat-larval group" have followed very similar lines of development. In *Cremastobombycia* the result has been modified somewhat by the shorter and very oblique, almost horizontal position of the white streak separating Bands I and II. A white basal streak

when formed is therefore nearer the dorsal margin. The chief forces acting in the evolution of the pattern in this subgenus are the more rapid growth distad of Band II as compared with Band III and the extension proximad of the extremities of Bands III and IV. The sequence of the species is as follows: *grindeliella* (Figs. 59*a*, 59*b*), *solidaginis* (Fig. 60), *ambrosiella* (Fig. 61), *ignota* (Fig. 62), *verbesinella* (Fig. 63). *Grindeliella* shows the basal streak in actual process of formation; where the dorsal arm of the first fascia is wanting, the black scales at the tip of the basal streak are homologous with those on the outer margin of the fascia. All show the tendency which arises independently throughout the "flat-larval group" also, toward the complete fusion of Bands V and VI. None of these species can be regarded as very primitive. The similarity to a group of species in the division of the genus shortly to be discussed is due to the fact that the same laws underlie their evolution.

A tendency similar to that witnessed among several of the species of the first division of the genus, toward the preservation of Bands II and III in a shape approaching the primitive, prevails among many of the species of the second division of the genus. *Obstrictella* (Fig. 64) has preserved Bands II, III and IV in a very primitive condition; during its differentiation, however, the white streak at the base has been entirely obliterated.

Above this level, evolution takes place in four divergent directions, as represented on Plate IV.

In one of these branches, Bands II, III and IV tend to remain separate. Within this group, the first step in evolution is the outward extension of the middle of Band IV to meet Band V; at the same time the bands become displaced very slightly toward the base of the dorsum; the fasciæ between them are not as yet angulated. Specific differentiation at this level has produced *tubiferella* (Fig. 65), in which all white markings beyond the fasciæ, except sometimes a minute white dot before the apex, have been suffused with ground color; *aceriella* (Fig. 66) and *hamameliella* (Fig. 67), the latter more advanced because of its deeper ground color; *ostryarella* (Fig. 68), *corylisella* (Fig. 69), *æsculisella* (Fig. 70) and *guttifinitella* (Fig. 71). The loss of the white streak at the base seems to be accomplished after the principal changes in the configuration of the ground color have been brought about, that is, after specific differentiation has set in. The fact that the white streak extends entirely across the wing, separating Bands I and II completely in such species as *hamadryadella* (Fig. 77) and *umbellulariæ* (Fig. 78) which are by no means primitive in regard to the shape of the areas of ground color, and observations on the development of color in the pupal wings of *æsculisella*, support this hypothesis.

In *caryæfoliella* (Fig. 72) and *lentella* (Fig. 73), the bands have become quite distinctly though obtusely angulated.

Above this level evolution has taken divergent paths. In one direction, evolution in the shape of Bands II, III and IV has progressed in the same manner

and at the same rate, so that although the fasciæ between them have become acutely angled, they have remained parallel. *Macrocarpella* (Fig. 74) and *cincinnatiella* (Fig. 75) have been differentiated at this level. These two species are characterized by an unusual number of dark tipped scales; the fasciæ are also internally dark margined near the costa. In *saccharella* (Fig. 76) evolution has continued farther, and other changes of a different character have resulted. There has been a slight displacement of the dorsal oblique streaks toward the base; the first of these is brought into contact with the basal streak. The costal portion of the first fascia has been replaced by the ground color.

In the other direction, where evolution has progressed at a more rapid rate on the outer edge of Band III and inner edge of Band IV, than on the outer and inner edges of Bands II and III respectively, the second fascia will be more acutely angled and its arms more oblique than the first fascia. Such is the condition in *hamadryadella* (Fig. 77), *umbellulariæ* (Fig. 78) and *agrifoliella* (Fig. 79). In the first of these there is but little divergence in direction of the two fasciæ, evolution in this direction having halted comparatively early. Specific differentiation progressed rapidly and dark pigment developed along the outer as well as the inner edges of the bands. At this stage regressive changes have commenced; the bands have shrunk away toward the base, most rapidly at the extremities, but also in the middle, leaving behind them the lines of dark scales which marked their former outer edges. In *umbellulariæ* and *agrifoliella*, progressive evolution continued longer, and the arms of the second fascia are very oblique compared with those of the first. Specific differentiation has continued longer in *agrifoliella* than in *umbellulariæ;* the *recent* disappearance of the white fascia separating Bands I and II is shown by the presence of black scales external to its normal position and by the occasional presence of a few pale scales anterior to them.

In all of these species characterized by two white fasciæ, there is a tendency toward a disproportionate acceleration of the outward extension of the bands along the cell, with the attendant result that the fasciæ are often interrupted at the angle.

In a collateral line of development, there has been an early acceleration in the processes of evolution affecting the outer edge of Band II and the inner edge of Band III. As a result Band II becomes fused with Band III over a considerable space in the middle of the wing, at a period when III and IV are still separated from one another by an angulated fascia. *Fletcherella* (Fig. 80), *arcuella* (Fig. 81), *betulivora* (Fig. 82), *australisella* (Fig. 83), *bethunella* (Fig. 84), *chambersella* (Fig. 85), *cervina* (Fig. 86), *platanoidiella* (Fig. 87), *castaneæella* (Fig. 88) and *fasciella* (Fig. 89) have followed this path of evolution. *Chambersella* (Fig. 85), *cervina* (Fig. 86) and *platanoidiella* (Fig. 87) have been differentiated subsequent to the first five species; fusion of Bands II and III has been complete in the dorsal half of the wing.

In *castaneæella* (Fig. 88) and *fasciella* (Fig. 89), evolution has progressed more slowly on the outer edge of Band III and inner edge of Band IV; the median fascia remains almost straight, but the other white markings have almost disappeared.

In two species, *nemoris* (Fig. 90) and *gaultheriella* (Fig. 91), the relations between the progressive changes in Bands II and III have been reversed. The tendency here is toward a fusion of Bands III and IV earlier than II and III, with the result that the second fascia is separated into opposite spots earlier than the first. *Gaultheriella* is the more advanced of these two species.

In all of the groups whose evolution has just been traced, the action of the third process of evolution, namely, the retraction of pigment from the outer edges of the extremities of bands, has been of minor importance. In the evolution of four species, *mediodorsella* (Fig. 92), *quercivorella* (Fig. 93), *conglomeratella* (Fig. 94) and *ulmella* (Fig. 95), the characteristic longitudinal white streak has originated through the action of this process at the extreme dorsal end of each of Bands II, III and IV in sequence, followed by the extension of color toward the base from Bands III and IV, just within the dorsal margin. This is analagous to the process which has occurred in species of the first division of the genus, where it was observed that the most rapid extension of a band into the white streak preceding it took place just within the margin. These processes occur first near the base, then the bands more and more distad are involved. In *mediodorsella* (Fig. 92) Band IV has not yet been produced toward the base to obliterate the dorsal arm of the median fascia; in *quercivorella* (Fig. 93) this advance has been made. In *conglomeratella* (Fig. 94) and *ulmella* (Fig. 95), the regressive changes have been extended to Band IV, which has shrunk away on the margin, allowing the white oblique streak to move proximally along the margin until it has united with the more proximal portion of the longitudinal streak. This theory of the origin of the longitudinal dorso-basal white streak is substantiated by the variations in its width. It is widest at points corresponding to the original extremities of the white fasciæ, and narrowest immediately behind them.

From the foregoing account of the evolution of the groups and species of *Lithocolletis*, it is evident that the general evolution of the pattern of the ground color may halt at any level and the species differentiated at this level constitute a natural group of species more closely related to one another than to any other species. The level at which evolution has come to a standstill is no absolute criterion of the age of the individual species within a group. A species with but few specialized specific characters in a group whose color pattern marks it as of recent origin may be older phylogenetically than one of a more primitive group, where the high degree of specific differentiation attained marks it as of recent origin. It is to be expected that the most highly differentiated species, that is, those where the darker colors predominate both as regards ground color and markings, would be found in groups where the pattern of the ground color has a

less degree of modification; the earlier evolution in this direction has halted, the longer will have been the time available for specific differentiation. On the other hand, species belonging to groups recently established and hence of high phylogenetic position, may be almost lacking in the darker colors. Actual examples of each of these possibilities are furnished among our species; *morrisella* (Fig. 48, Pl. III) and *fragilella* (Fig. 3, Pl. III) are examples of the first, *quercialbella* (Fig. 46, Pl. III) of the second possibility.

III. GENERAL DISCUSSION.

Ontogenetic and phylogenetic studies upon the development of the color pattern in *Lithocolletis* lead to the conclusion that evolution has taken place in definite directions under the action of a few definite laws; in other words, that it has been orthogenetic. It was shown that the primitive color pattern, the first to be laid down upon the white wing, is a series of seven uniformly colored, pale yellow transverse bands. From these, the color areas, which form the *ground color* of the various groups of species, have been derived. The first tendency observed is a uniform widening of the bands. Evolution in the shape and extent of the primitive bands of ground color, as has been shown (see page 141), has been brought about by three definite processes, two of which were observed in actual operation in the development of color in the pupal wings; the third is a necessary inference from the lack of agreement between the primitive positions of the bands and their positions in the more advanced species. The most far-reaching and widespread changes have taken place toward the base of the wing proximal to the transverse vein.

The final result of the action of these three processes is a uniform ground color; this uniformity will be attained first near the base of the wing, since it is here that evolution has proceeded most rapidly. The color bands in the apical half of the wing, which were laid down later, are modified at a slower rate and retain more nearly their primitive shape. These observations are in agreement with the general principle that development is more rapid in the anterior and proximal parts of an organism.

The observed evolution in the pattern of the ground color suggests that *the uniform yellowish ground color which suffuses the wing in the higher Lepidoptera, beginning at the base and spreading distalward, is the outcome of a phylogenetically older type of marking, originally banded, and later fused to a uniform color, and that the markings are a second series superimposed upon the first.*

If the disposal of the transverse primitive bands of ground color is dependent upon the positions of the nervures, as my observations on *Lithocolletis* have indicated, then in the primitive color pattern of the ancestral Lepidoptera where more veins are present and their arrangement on the margins is more symmetrical, the number of these bands should be considerably augmented. As evolution has proceeded, this primitive type of color pattern would have been modified in various ways. Attendant upon the degradation in venation in some

of the lower groups, there must have been immediate and complete fusion of bands occupying adjacent interspaces, when the vein which separated them was lost. Modification in the shape of the wings, resulting in changes in the relative positions of the nervures, must also have been an important factor in producing correlated changes in the primitive color pattern by bringing about displacement and fusion of some of the bands. Just what modifications in the color pattern would have been produced by the direct action of these conditions, could only be determined by a complete knowledge of the actual series of changes which have taken place in the wings of Lepidoptera. Beyond, and apparently independent of these factors, there is the evolution in the shape and extent of the color areas themselves.

It was found that dark markings, properly so-called, appeared at the limits between ground color and unpigmented areas. Increase in breadth of a dark marking takes place away from an unpigmented area. The dark markings do not appear until the edge of a color area has remained constant for an appreciable length of time. Since they appear at the edges of color areas, their shape and position are in great part determined by the same laws which control the evolution of the pattern of the ground color. Markings once formed tend to become permanent and immovable. Thus we find that the suffusion of an unpigmented area with ground color subsequent to the formation of a dark streak does not affect its permanency; the shrinking away of ground color leaves a dark streak or line isolated in an otherwise unpigmented area. Therefore, *although, during the early stages of evolution, the development of markings was entirely dependent on the configuration of the ground color, these markings once permanently established in the race, tend to reappear independently of the ground color. When this level has been reached in racial history, we have a series of transverse markings appearing on a uniform ground color.* This is the condition in all of the higher Lepidoptera. In the ontogeny of such groups, there is no evidence to show that these markings are a second series superimposed upon the earlier primitive one.

If the theory of the origin of dark markings on opposite edges of primitive bands of ground color is a valid one, we should expect to find in the higher types, that there is a tendency for dark stripes to recur in pairs, and that fusions at any single period would be more apt to occur between any *two* consecutive stripes than between three consecutive stripes. Observations confirm this hypothesis. Among many of the Pyralids, the dark markings are formed of two dark lines connected by a paler color; each of these marks is separated from a similar pair of lines by ground color. Even in the butterflies, the tendency toward grouping of dark marks in pairs is witnessed. Eimer's ('97) series of adult forms of *Papilio* and von Linden's ('98, '02) figures of the pupal development illustrate this principle. In the pupal development of the wings of *Papilio machaon,* the tendency for the dark scales to appear first at the edges of bands was noted; bands thus formed have, on my hypothesis, originated from the fusion of dark stripes situated on either side of a primitive band.

The great diversity to be observed in the position, shape and extent of the dark markings in the various groups of Lepidoptera, is due to differences in the direction of evolution of the pattern of the ground color, and the different levels at which it has halted, permitting the dark markings to develop.

The actual appearance of dark pigment in certain defined positions is probably due to physiological factors; just why these processes should occur contiguous to unpigmented areas is largely a matter of conjecture. It is possible that the chemical changes involved are oxidative in their nature; the presence of air in the unpigmented hollow scales may possibly accelerate chemical processes along this line. This supposition will however not account for the phylogenetic permanency of such markings after the ground color covers the wing uniformly.

The investigations of previous workers upon the color patterns of Lepidoptera have been limited to the markings, that is, to that series which I have designated as secondary and superimposed upon an original primary color pattern. In as much, however, as these markings have originally been determined by the configuration of the pattern of the ground color, the laws concerning their places of appearance should agree with my observations on the evolution of the pattern of the ground color; it is on the contrary not to be expected that these laws concerning behavior of the markings will apply in their entirety to the comparatively primitive and phylogenetically older type of markings in this genus. The laws governing the color pattern have been based upon more highly developed markings often of comparatively recent origin phylogenetically. For convenience in comparison a statement of some of these laws of coloration follows. The following are those advanced by Mayer ('97):

"(*a*) Any spot found upon the wings of a moth or butterfly tends to be bilaterally symmetrical, both as regards form and color, the axis of symmetry being a line passing through the center of the interspace in which the spot is found, and parallel to the direction of the longitudinal nervures. (*b*) Spots tend to appear not in one interspace only, but as a row occupying homologous places in successive interspaces. Indeed we almost always find spots arranged in linear series, each similar in shape and color to the others and occupying the center of its interspace. (*c*) It is interesting to notice that bands of color are often made by the fusion of a row of adjacent spots; and conversely, chains of spots are often formed by the breaking up of bands, leaving a row of spots occupying the interspaces. (*d*) The most common method of disappearance is a shrinking away of the band at one end. It is very common to find bands shrinking away at one end. This is a special case of Bateson's law that the ends of a linear series are more variable than the middle. Sometimes however they shrink away at both ends, and very often, they break up into a row of spots, which may then contract into the centers of their interspaces and finally disappear. It is worthy of note that it is very rare to find a band breaking at the middle of its length and each half receeding from the other. (*e*) The position of

spots which are situated near the edge of the wing is largely controlled by the wing-folds or creases."

Eimer has derived the various types of coloration from a series of transverse stripes (termed by him longitudinal because parallel to the longitudinal axis of the body) which break up into spots which fuse crosswise to form markings parallel to the longitudinal nervures, and finally fuse to a uniform color. New markings appear on the body of the animal from behind forwards and from above downwards, or conversely, whilst the old ones disappear in the same direction and succession.

I have shown that the ground color has been derived from a series of such transverse elements; conversion into a uniform color has taken place directly by an extension of color onto previously unpigmented areas, distad through the middle of the wing in the cell, proximad on the margins. The positions of the markings are arbitrarily determined. They are dependent upon the level at which evolution in the pattern of the ground color acting in a few definite directions has come to a standstill. The actual appearance of the markings is probably due to physiological activities whose nature is not understood. The first markings are usually transverse, rarely longitudinal when the modification in the ground color has been far-reaching. These transverse markings are in the nature of narrow lines or streaks, phylogenetically the forerunners of the bands of higher Lepidoptera. *Since the streaks and lines of dark scales in Lithocolletis still retain their primitive condition as originally laid down, it is not to be expected that the laws which Mayer has given*, based upon the transformation of spots and bands in the higher Lepidoptera, *would find wide application in this group.* Portions of a pair of such streaks in *Lithocolletis* will be found at the margins and in each interspace which the band from which they are derived crosses. Breaking up of bands formed by the growing together of these streaks will result in conditions such as Mayer has described for spots and series of spots. Any spot such as the apical spot is bilaterally symmetrical and occupies the center of its interspace. The primitive bands from which the ground color has been derived and which have been regarded as a primary set of markings upon which a second set, the markings proper, have been superimposed, have exhibited the tendency toward shrinking away at each end.

The ultimate causes which determine the definitive positions of the primitive bands are unknown. Von Linden has found that in the lower orders of insects, the coloring matter has a tendency to collect on transverse veins; this however does not bring us any nearer to a real explanation of the phenomenon of coloration. The probability that the origin of the markings, which appear secondarily, may be traced directly to physiological factors, renders it reasonable that the appearance of the primary series is conditioned by like physiological and morphological factors within the organism itself and is independent of external factors.

Evolution in the pattern of the primitive series of bands has been shown to have taken place in a few definite directions; the diverse patterns which have

been produced are the result of different combinations of three general processes already discussed.

IV. SUMMARY.

Observations on the development of color in the pupal wings and a comparison of the color pattern in adult forms of *Lithocolletis* have shown that in his group the primitive color pattern is a series of seven uniformly colored pale, yellow transverse bands, separated from one another by unpigmented areas. The disposal of these bands is dependent upon the course of the longitudinal nervures, since the points of origin or the tips of the veins mark the positions of the unpigmented fasciæ between the bands.

From this primitive color pattern, the several different types of color pattern in this genus have been derived. Evolution has taken place in definite directions, under the action of three general processes, which were found to be sufficient to explain the origin of the different color patterns. These processes have been stated thus: (*a*) The middle portion of a band may be produced distally until it comes in contact with the band beyond it. (*b*) The extremities of a band may be broadened by being produced proximally. (*c*) The extremities of a band may be narrowed by the retraction of pigment from their outer edges. The particular result in any case, that is, the configuration of the color areas, is due to the manner and extent of the action of these processes.

During pupal development, these phylogenetic changes are repeated only to a very limited extent; recapitulation is confined to those species or to those portions of the wing in which there has been the least modification of the primitive transversely banded type of marking.

These bands either in their primitive or modified shape, constitute the ground color. Upon this ground color, a second darker series of elements, the markings proper, also usually transverse, are superimposed. The different levels at which evolution in the pattern of the ground color has halted, that is, the configuration of the areas of ground color, are the important factors in determining the phylogenetic sequence of large groups; the particular colors and the markings determine the positions of the species within those groups.

These markings appear at the limits between ground color and unpigmented areas, as one or more lines of dark scales along the edge of a band adjacent to a white fascia or streak. Their appearance then is probably due to physiological factors within the organism itself, and is independent of external conditions. In the ontogeny, the relative time of appearance of the dark margin of any band is dependent upon the time when the edge of that band became fixed in the phylogeny. Before dark margins can develop, the edge of a band must have remained fixed for an appreciable time. Hence, where bands have been laid down late or have reached their present configuration late in racial development, the dark margin will develop at a correspondingly late period in ontogenetic development.

This principle holds good irrespective of whether or not there is a recapitulation of phylogenetic changes in the configuration of the color areas during pupal development. Therefore in the second and more recent set of characters, there is an actual recapitulation. A dark marking once permanently established in the race tends to reappear independently of the ground color, so that later suffusion of the unpigmented area contiguous to it with ground color, or the shrinking away of the ground color, does not affect its permanency.

Later in phylogenetic history, additional dark markings, other than those contiguous to unpigmented areas, may appear. The development of these characters in the pupa becomes much abridged, and concomitant with this, their time of appearance is pushed back into the earlier stages of pupal development, so that they may appear simultaneously with or even earlier than characters which are much older phylogenetically. However, only those characters permanently established and of long standing in a species exhibit this precocity of development; recently acquired or variable characters appear ontogenetically in the order of their phylogenetic sequence. Where certain characters appear unduly early in pupal development, physiological factors probably act directly in bringing about this result.

From a study of the phylogeny of the various groups of species, through the application of the processes of evolution already enumerated, it was found that the most far-reaching and widespread changes have taken place toward the base of the wing, proximal to the transverse vein. The final result is the production of a uniform ground color which will be attained earliest near the base of the wing where evolution has proceeded most rapidly.

This observed evolution in the pattern of the ground color suggests that the uniform yellowish ground color which suffuses the wing in the higher Lepidoptera, beginning at the base and spreading distalward, is the outcome of a phylogenetically older type of marking, originally banded, and later fused to a uniform color, and that the markings are a second series superimposed upon the first.

The observations made clearly point to the conclusion that the evolution of the color pattern in *Lithocolletis* has been orthogenetic.

LITERATURE CITED.

BEMMELEN, J. F. VAN

1889. Ueber die Entwickelung der Färben und Adern auf den Schmetterlingsflügeln. Tijdsch. der Nederland. Dierkundige Vereeniging, Ser. 2, Deel 2, pp. 235–247.

BRAUN, ANNETTE F.

1908. Revision of the North American Species of the Genus Lithocolletis Hübner. Trans. Am. Ent. Soc., vol. XXXIV, pp. 269–357, 5 pls.

1909. Phylogeny of the Lithocolletid Group. The Canadian Entomologist, vol. XLI, pp. 419–423.

CHAPMAN, T. A.

1902. The Classification of Gracilaria and Allied Genera. The Entomologist, vol. XXXV, pp. 81–88, 138–142, 159–164.

DIMMOCK, G.

1883. Scales of Coleoptera. Psyche, vol. IV, pp. 1–11, 23–27, 43–47, 63–71.

EIMER, G. H. T.

1897. On Orthogenesis and the Impotence of Natural Selection in Species-Formation. An address delivered at the Leyden Congress of Zoologists, Sept. 19, 1895. 55 pp. The Open Court Publishing Co., Chicago, 1898.

HAASE, E.

1893. Untersuchungen über die Mimicry auf Grundlage eines natürlichen Systems der Papilioniden. Bibliotheca Zoologica, Heft 8, Theil 1, 120 pp., 6 Taf.

1893*a*. Untersuchungen über die Mimicry auf Grundlage eines natürlichen Systems der Papilioniden. Bib. Zool., Heft 8, Th. 2, 161 pp., 8 Taf. English translation by C. M. Child. Stuttgart, 1896, 154 pp., 8 pls.

LINDEN, M. VON

1898. Untersuchungen über die Entwickelung der Zeichnung des Schmetterlingsflügeln in der Puppe. Zeitschr. für Wiss. Zool., Bd. LXV, pp. 1–49, pls. I–III.

1902. Le dessin des ailes des Lepidoptères, reserches sur son evolution dans l'ontogenèse at la phylogenèse des espèces, son origine et sa valeur systematique. Annales des Sci. Nat., vol. XIV, pp. 1–196, pls. I–XX.

MAYER, A. G.

1896. The Development of the Wing Scales and their Pigment in Butterflies and Moths. Bull. Mus. Comp. Zool., vol. XXIX, No. 5, pp. 209–235, 7 pls.

1897. On the Colors and Color Patterns of Moths and Butterflies. Proc. Bost. Soc. Nat. Hist., vol. XXVII, No. 14, pp. 243–330, 10 pls.

MEYRICK, E.

1912. Fam. Gracilariadae. Genera Insectorum, 128me Fascicule.

SCHÄFFER, C.

1889. Beiträge zur Histologie der Inseckten. Zoologische Jahrbücher, Abth. für Anatomie, Bd. III, Heft 4.

TOWER, W. L.

1906. An Investigation of Evolution in Chrysomelid Beetles of the Genus Leptinotarsa. Carnegie Institution of Washington, Publication No. 48.

URECH, F.

1891. Beobachtungen über die verschiedenen Schuppenfärben und die zeitliche Succession ihres Auftretens (Farbenfelderung) auf den Puppenflügelchen von Vanessa urticæ und V. oi. Zool. Anz., Jahr. XIV, pp. 466–475.

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EXPLANATION OF PLATES III AND IV.

PLATE III.

Phylogenetic tree illustrating the evolution of the species of the "cylindrical-larval group" of *Lithocolletis* and of *Porphyrosela*. (The figures on this and the following plate are three times natural size.)

FIG. 1. *Lithocolletis tiliacella* Cham.
FIG. 2. " *oregonensis* Wlsm. (not illustrated).
FIG. 3. " *fragilella* F. and B.
FIG. 4. " *celtifoliella* Cham.
FIG. 5. " *tritænianella* Cham.
FIG. 6. " *affinis* F. and B. (not illustrated).
FIG. 7. " *ostensackenella* Fitch.
FIG. 8. " *mariæella* Cham.
FIG. 9. *Porphyrosela desmodiella* Clem.
FIG. 10. *Lithocolletis auronitens* F. and B.
FIG. 11. " *argentinotella* Clem.
FIG. 12. " *occitanica* F. and B. (not illustrated).
FIG. 13. " *leucothorax* Wlsm.
FIG. 14. " *fitchella* Clem.
FIG. 15. " *salicifoliella* Clem.
FIG. 16. " *tremuloidiella* Braun.
FIG. 17. " *hageni* F. and B.
FIG. 18. " *arbutusella* Braun.
FIG. 19. " *insignis* Wlsm. (not illustrated).
FIG. 20. " *insignis* Wlsm.
FIG. 21. " *caryæalbella* Cham.
FIG. 22. " *rileyella* Cham.
FIG. 23. " *ostryæfoliella* Clem.
FIG. 24. " *olivæformis* Braun.
FIG. 25. " *obscuricostella* Clem.
FIG. 26. " *kearfottella* Braun.
FIG. 27. " *populiella* Cham.
FIG. 28. " *diaphanella* F. and B.
FIG. 29. " *salicivorella* Braun.
FIG. 30. " *deceptusella* Cham.
FIG. 31. " *alni* Wlsm. (not illustrated).
FIG. 32. " *alnicolella* Wlsm.
FIG. 33. " *ledella* Wlsm.
FIG. 34. " *incanella* Wlsm.
FIG. 35. " *scudderella* F. and B.
FIG. 36. " *cratægella* Clem.
FIG. 37. " *malimalifoliella* Braun.
FIG. 38. " *propinquinella* Braun.
FIG. 39. " *sexnotella* Cham.
FIG. 40. " *aeriferella* Clem.
FIG. 41. " *obsoleta* F. and B.
FIG. 42. " *albanotella* Cham.
FIG. 43. " *argentifimbriella* Clem.
FIG. 44. " *lucidicostella* Clem.
FIG. 45. " *clemensella* Cham.
FIG. 46. " *quercialbella* Fitch.
FIG. 47. " *trinotella* Braun.
FIG. 48. " *morrisella* Fitch.
FIG. 49. " *uhlerella* Fitch.
FIG. 50. " *robiniella* Clem.
FIG. 51. " *lucetiella* Clem.
FIG. 52. " *martiella* Braun.
FIG. 53. " *gemmea* F. and B.
FIG. 54. " *symphoricarpella* Cham.
FIG. 55*a*. " *apicinigrella* Braun.
FIG. 55*b*. " *apicinigrella* Braun.
FIG. 56. " *celtisella* Cham.
FIG. 57. " *basistrigella* Clem.
FIG. 58. " *bataviella* Braun.

PLATE IV.

Phylogenetic tree illustrating the evolution of the species of Cremastobombycia and of the "flat-larval group" of *Lithocolletis*.

FIG. 59*a*. *Cremastobombycia grindeliella* Wlsm.
FIG. 59*b*. " *grindeliella* Wlsm.
FIG. 60. " *solidaginis* F. and B.
FIG. 61. " *ambrosiella* Cham.
FIG. 62. " *ignota* F. and B.
FIG. 63. " *verbesinella* Busck.
FIG. 64. *Lithocolletis obstrictella* Clem.
FIG. 65. " *tubiferella* Clem.
FIG. 66. " *aceriella* Clem.
FIG. 67. " *hamameliella* Busck.
FIG. 68. " *ostryarella* Cham.
FIG. 69. " *corylisella* Cham.
FIG. 70. " *æsculisella* Cham.
FIG. 71. " *guttifinitella* Clem.
FIG. 72. " *caryæfoliella* Clem.
FIG. 73. " *lentella* Braun.
FIG. 74. " *macrocarpella* F. and B.
FIG. 75. " *cincinnatiella* Cham.
FIG. 76. " *saccharella* Braun.
FIG. 77. " *hamadryadella* Clem.
FIG. 78. " *umbellulariæ* Wlsm.
FIG. 79. " *agrifoliella* Braun.
FIG. 80. " *fletcherella* Braun.
FIG. 81. " *arcuella* Braun.
FIG. 82. " *betulivora* Wlsm.
FIG. 83. " *australisella* Cham.
FIG. 84. " *bethunella* Cham.
FIG. 85. " *chambersella* Wlsm.
FIG. 86. " *cervina* Wlsm.
FIG. 87. " *platanoidiella* Braun.
FIG. 88. " *castaneæella* Cham.
FIG. 89. " *fasciella* Wlsm.
FIG. 90. " *nemoris* Wlsm.
FIG. 91. " *gaultheriella* Wlsm.
FIG. 92. " *mediodorsella* Braun.
FIG. 93. " *quercivorella* Cham.
FIG. 94. " *conglomeratella* Zell.
FIG. 95. " *ulmella* Cham.

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WRITINGS ON ARCHÆOLOGY.

By Clarence B. Moore.

Certain Shell Heaps of the St. Johns River, Florida, hitherto unexplored. The American Naturalist, Nov., 1892, to Jany., 1894, inclusive. Five papers with illustrations in text, and maps.

Certain Sand Mounds of the St. Johns River, Florida, Parts I and II. Journal of the Academy of Natural Sciences of Philadelphia, Philadelphia, 1894. Vol. X. Quarto, 130 and 123 pages. Frontispieces, maps, plates, illustrations in the text.

Certain Sand Mounds of Duval County, Florida; Two Mounds on Murphy Island, Florida; Certain Sand Mounds of the Ocklawaha River, Florida. Journ. Acad. Nat. Sci. of Phila., 1895. Vol. X. Quarto, 108 pages. Frontispiece, maps, plates, illustrations in text.

Additional Mounds of Duval and of Clay Counties, Florida; Mound Investigation on the East Coast of Florida; Certain Florida Coast Mounds north of the St. Johns River. Privately printed, Philadelphia, 1896. Quarto, 30 pages. Map, plates, illustrations in text.

Certain Aboriginal Mounds of the Georgia Coast. Journ. Acad. Nat. Sci. of Phila., 1897. Vol. XI. Quarto, 144 pages. Frontispiece, map, plates, illustrations in text.

Certain Aboriginal Mounds of the Coast of South Carolina; Certain Aboriginal Mounds of the Savannah River; Certain Aboriginal Mounds of the Altamaha River; Recent Acquisitions; A Cache of Pendent Ornaments. Journ. Acad. Nat. Sci. of Phila., 1898. Vol. XI. Quarto, 48 pages. Frontispiece, maps, illustrations in text.

Certain Aboriginal Remains of the Alabama River. Journ. Acad. Nat. Sci. of Phila., 1899. Vol. XI. Quarto, 62 pages. Map, illustrations in text.

Certain Antiquities of the Florida West-Coast. Journ. Acad. Nat. Sci. of Phila., 1900. Vol. XI. Quarto, 46 pages. Maps, illustrations in text.

Certain Aboriginal Remains of the Northwest Florida Coast, Part I; Certain Aboriginal Remains of the Tombigbee River. Journ. Acad. Nat. Sci. of Phila., 1901. Vol. XI. Quarto, 100 pages. Maps, illustrations in text.

Certain Aboriginal Remains of the Northwest Florida Coast, Part II. Journ. Acad. Nat. Sci. of Phila., 1902. Vol. XII. Quarto, 235 pages. Maps, illustrations in text.

Certain Aboriginal Mounds of the Central Florida West-Coast; Certain Aboriginal Mounds of the Apalachicola River. Journ. Acad. Nat. Sci. of Phila., 1903. Vol. XII. Quarto, 136 pages. Maps, illustrations in text.

Sheet-copper from the Mounds is not Necessarily of European Origin. American Anthropologist, Jan.-March, 1903. Plates in text.

The So-called "Hoe-shaped Implement." American Anthropologist, July-Sept., 1903. Illustrations in text.

Aboriginal Urn-burial in the United States. American Anthropologist, Oct.-Dec., 1904. Plate.

A Form of Urn-burial on Mobile Bay. American Anthropologist, Jan.-March, 1905.

Certain Aboriginal Remains of the Black Warrior River [Moundville]; Certain Aboriginal Remains of the Lower Tombigbee River; Certain Aboriginal Remains of Mobile Bay and Mississippi Sound; Miscellaneous Investigation in Florida. Journ. Acad. Nat. Sci. of Phila., 1905. Vol. XIII. Quarto, 206 pages. Maps, illustrations in text.

Moundville Revisited; Crystal River Revisited; Mounds of the Lower Chattahoochee and Lower Flint Rivers; Notes on the Ten Thousand Islands, Florida. Journ. Acad. Nat. Sci. of Phila., 1907. Vol. XIII. Quarto, 144 pages. Maps, illustrations in text.

Certain Mounds of Arkansas and of Mississippi (including Doctor Hrdlička's paper on the Crania). Journ. Acad. Nat. Sci. of Phila., 1908. Vol. XIII. Quarto, 130 pages. Maps, illustrations in text, eight colored plates.

Antiquities of the Ouachita Valley. Journ. Acad. Nat. Sci. of Phila., 1909. Vol. XIV. Quarto, 170 pages. Maps, illustrations in text, eight colored plates. (In addition in this number is Doctor Hrdlička's paper on the skeletal remains.)

Antiquities of the St. Francis, White, and Black Rivers. Journ. Acad. Nat. Sci. of Phila., 1910. Vol. XIV. Quarto, 112 pages. Maps, illustrations in text, twenty colored plates.

Some Aboriginal Sites on Mississippi River. Journ. Acad. Nat. Sci. of Phila., 1911. Vol. XIV. Quarto, 116 pages. Map, illustrations in text, eight colored plates.

Some Aboriginal Sites on Red River. Journ. Acad. Nat. Sci. of Phila., 1912. Vol. XIV. Quarto, 163 pages. Map, plans, illustrations in text, eight colored plates.

Some Aboriginal Sites in Louisiana and in Arkansas. (Atchafalaya River, Lake Larto, Tensas River, Bayou Maçon, Bayou D'Arbonne, in Louisiana; Saline River, in Arkansas.) Journ. Acad. Nat. Sci. of Phila., 1913. Vol. XVI. Quarto, 102 pages. Maps, plans, illustrations in text, two colored plates.

Aboriginal Sites on Tennessee River. Journ. Acad. Nat. Sci. of Phila., 1915. Vol. XVI. Quarto, 258 pages. Maps, plans, illustrations in text, four colored plates.

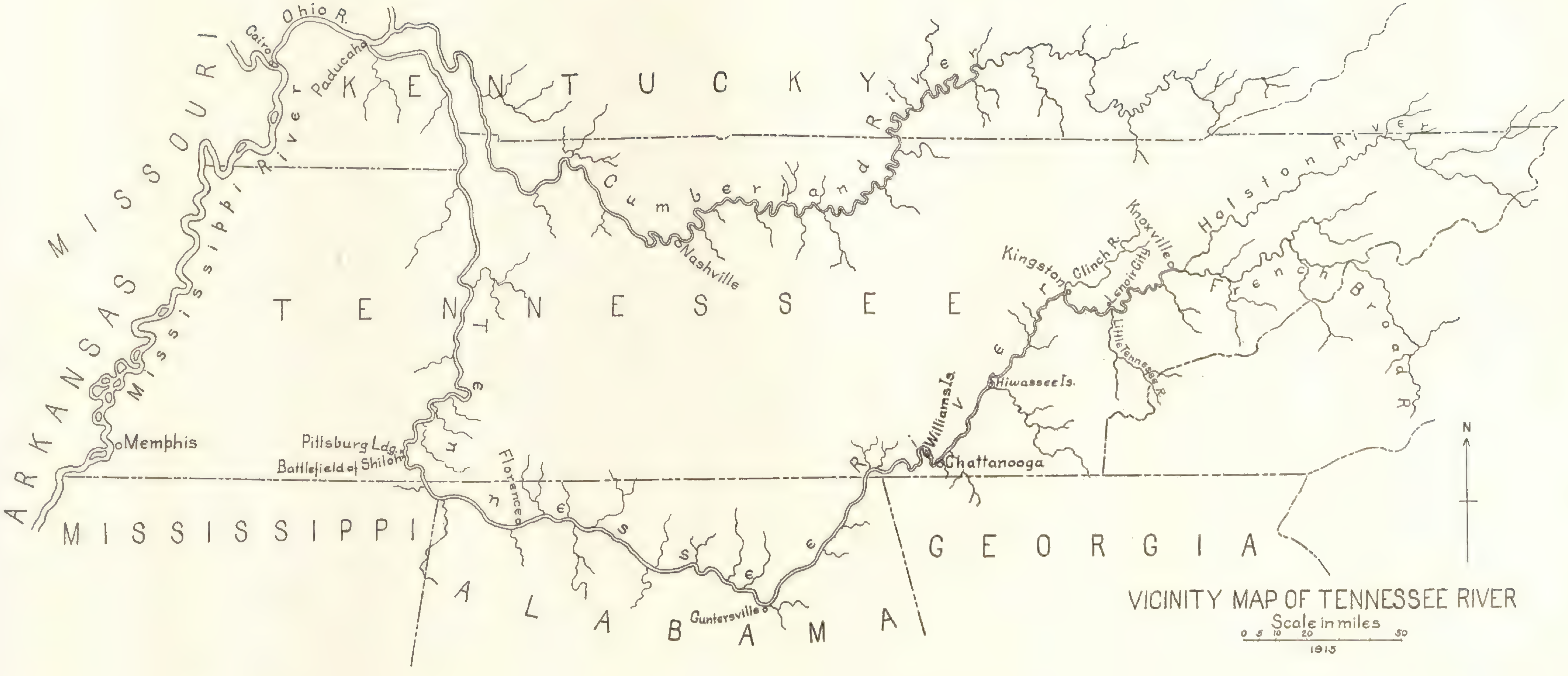
Aboriginal Sites on Tennessee River

BY

CLARENCE B. MOORE

PHILADELPHIA

1915



VICINITY MAP OF TENNESSEE RIVER

ABORIGINAL SITES ON TENNESSEE RIVER.

By Clarence B. Moore.

INTRODUCTION.

That subdivision of the United States of America known as the State of Tennessee takes its name from that of two or more Cherokee settlements.[1] The meaning of the word (*Tănăsí*) has not been determined.

The archæology of few States of the Union has been more widely described than has that of Tennessee, especially the region having the city of Nashville as a center.

Archæological investigations, mainly in eastern Tennessee, conducted by Rev. E. O. Dunning in behalf of Peabody Museum of Harvard University, are included in the Third (1870) and Fifth (1872) Annual Reports of that institution, with an account of the collection by Jeffries Wyman.

The explorations of Joseph Jones, M.D., mainly in the Cumberland valley, are described by him in "Explorations of the Aboriginal Remains of Tennessee."[2]

Prof. Frederic Ward Putnam gives an account of his archæological researches in central Tennessee in the Eleventh Annual Report of Peabody Museum of Harvard University, 1878. These explorations were continued under Professor Putnam's direction by Mr. E. Curtis until 1880. Numerous references to this work are given in the Reports of the Museum to 1881.

Archæological work in Tennessee by agents of the Bureau of American Ethnology, mainly along the Little Tennessee, but including a few sites on Tennessee river, is described in the Twelfth Annual Report of the Bureau.

In the Reports of the Smithsonian Institution, *passim*, are to be found accounts of archæological research in Tennessee.

A partial list of Tennessee mounds and sites is given by Cyrus Thomas in his "Catalogue of Prehistoric Works East of the Rocky Mountains,"[3] Bureau of of American Ethnology, 1891.

Prof. William H. Holmes, in various writings contained in the Annual Reports of the Bureau of American Ethnology, notably in his "Art in Shell of the Ancient Americans,"[4] and his "Aboriginal Pottery of Eastern United States,"[5] discusses the aboriginal art of Tennessee.

The late General Gates P. Thruston, in his comprehensive work, "The Anti-

[1] "Handbook of American Indians," Bureau of American Ethnology, Bulletin 30.
[2] Smithsonian Contributions to Knowledge, Vol. XXII, p. 259, 1876.
[3] Bulletin 12.
[4] Second Annual Report, pp. 179–305.
[5] Twentieth Annual Report, pp. 1–201.

quities of Tennessee" (second edition, 1897), details in a most interesting way his explorations in the great cemeteries near Nashville, Tenn., and the archæology of the State in general.

Mr. W. E. Myer, of Carthage, Tenn., who has widely explored aboriginal sites along Cumberland river and whose collection is so well known, has written "An Old Shawnee Town on Cumberland River," and "The Caverns and Rock-shelters of Cumberland Valley."

As to the former inhabitants of Tennessee we are told[1] that, in later times, the area occupied by the Cherokee embraced the valley of the Tennessee. Thruston[2] says that in the historical period the Shawnee once held sway from the Ohio river to the Tennessee, and Doctor Jones[3] asserts that the Chaouanons, or Shawnee, inhabited the valleys of Kentucky and Tennessee, more especially the Cumberland, and cites Robertson's statement that the region occupied by the Shawnee was from Tennessee river to north of the Cumberland. The "Handbook of American Indians"[4] calls the basin of the Cumberland the early home of the Shawnee. Doubtless at one time the Shawnee occupied much[5] of what is now the State of Tennessee.

However, to adduce evidence that a territory was once peopled by a certain tribe is one thing, but to prove that this tribe constructed the mounds and graves found in that region is quite a different matter. Those who have written on the archæology of Tennessee have, with commendable conservatism, contented themselves with ascribing to the "Stone Grave people" the mounds, graves, and artifacts of that region, that are connected with the use of stone in sepulture, while aboriginal interments not associated with stone, have been, with equally praiseworthy caution, left unassigned to any particular tribe.

The stone grave, the most distinctive feature of the archæology of Tennessee, though found in northern Georgia,[6] West Virginia,[7] Kentucky, southwestern Ohio,[8] eastern Indiana,[7] southern Illinois, and sparingly in Missouri,[9] and, as

[1] "Handbook of American Indians," Part 1, p. 616.

[2] *Op. cit.*, p. 22.

[3] *Op. cit.*, pp. 147, 154.

[4] Part 2, p. 531.

[5] And probably even to the south of Tennessee. Through the courtesy of Dr. Aleš Hrdlička we give an extract from a letter to him from Dr. John R. Swanton. "'The Indians of Marshall County, Alabama,' by Oliver Day Street of Guntersville, Ala., published in the Transactions of the Alabama Historical Society, Vol. IV, p. 193–210. This writer brings forward historical and traditional information to show that the Shawnee occupied the region of the great bend of the Tennessee in northern Alabama between 1660 and 1721. He even locates 'their principal town' 'near Tennessee river,' etc. Upon the whole there is reason to suppose that during the time when they were settled upon the Cumberland the Shawnee also made settlements on the Tennessee as well, but I do not think their occupancy of that region was of long duration."

[6] 12th An. Rep. Bur. Am. Ethn., p. 302 *et seq.* C. C. Jones, "Antiquities of the Southern Indians," Chapter X.

[7] 12th An. Rep. Bur. Am. Ethn., p. 571.

[8] Gerard Fowke, "Archæological History of Ohio," Chap. XI.

[9] David I. Bushnell, Jr., "Archæological Investigation in Ste. Geneviève County, Missouri," Proc. U. S. Nat. Mus., Vol. 46, pp. 641–668, 1914. Thruston, *op. cit.*, p. 28, footnote.

we have been the first to show, in northern Alabama, had such extensive use in Tennessee that in the minds of most it is associated chiefly with that State. "It is in Tennessee that this special form of grave seems to have been made with the greatest care and maintained with slight variation in construction. It is here, also, that the largest cemeteries consisting of burials in stone graves are found and that the graves are often made over one another in tiers forming stone grave mounds."[1]

Now let us examine the form and contents of the stone graves, as heretofore described.

Putnam[2] writes:

"One grave which I opened at Zollicoffer Hill [central Tennessee], though only a few inches under the surface, had escaped former disturbance. This grave was formed of six slabs of stone on one side and five on the other, with one slab at the head, and one at the foot; forming a grave five feet eight inches in length, inside measure, and six feet outside; the average width being eighteen and the depth sixteen inches. The side stones were unevenly broken to dimensions of eight to fifteen inches in width, by about twenty inches in depth and two or three inches in thickness. The two stones forming the head and foot of the grave were larger than those on the sides. All these stones extended a few inches below the floor of the grave, which was made by placing thinner and smaller pieces of stone in such a manner as to form a level bottom to this cist.[3] Five slabs of stone, larger than those used on the sides, rested on the nearly even edges of the upright stones, and, slightly overlapping, formed the cover or top of the grave.

"Further examination in other localities showed that all the stone graves were made after this plan, the only variation being in the size [and number] of the stone slabs and in the dimensions of the graves. Any rock was used that could be easily detached in slabs of convenient size. That most common to the localities I visited was limestone and sandstone."

Doctor Jones[4] says:

"The manner of burial seems to have been as follows: An excavation of a size agreeing with that of the body of the dead was made in the ground, and the bottom carefully paved with flat stones. Flat stones or slabs of limestone and slaty sandstone were placed along the sides and at the head and foot of the grave. The body was then placed within this rude coffin, and with it were deposited vases, small ornaments, pearls, beads, bands of wampum, large sea-shells, idols, warlike implements, stone hatchets and chisels, spear-heads, arrow-heads, stone

[1] Note contributed by Professor Putnam, who adds that, so far as he is aware, the building of stone graves in tiers so as to form mounds is confined to central Tennessee, where some of this kind were explored by him, and by Mr. Curtis under Professor Putnam's direction.

[2] *Op. cit.*, p. 306.

[3] In some instances Putnam found that the bottoms of the graves were covered with potsherds, and still others had evidently had the floors covered with bark. Peabody Mus. Reports, Vol. 3, p. 163.

[4] *Op. cit.*, p. 8.

swords, paint bowls, and even copper ornaments. The top of the grave was then covered with one or more flat stones. The upper slabs covering the graves were generally on a level with the surface of the ground. In some localities, however, and especially in the most carefully constructed burial mounds, the graves were covered with a foot of earth or more. . . .

"In some localities the sides of the tombs stood up above the surface from four to eight inches, as in the case of the stone graves described by Bartram. When a number of coffins were placed together, the side stones of the first frequently constituted the side of the second, and so on. Many of the stone graves are quite small, and capable of containing only the body of a *new-born* infant. These small graves were constructed with great care, and the sides, bottom and top were formed of much thinner and smoother slabs than the graves of the adults. Many of the short, square graves, not more than eighteen inches or two feet in length, contained the bones of adults piled together, the crania being surrounded by or resting upon the arm and leg bones."

Doctor Jones next proceeds to explode the theory advanced by certain writers of the old school who desired to appeal to the sense of wonder (a class not yet extinct), that the small graves contained remains of a pigmy race.[1]

Thruston[2] describes the stone graves of central Tennessee as follows:

"The rude cists or box-shaped coffins are made of thin slabs of stone. Sometimes the stones are broken or cut, or rubbed down, so as to fit evenly and form a well-shaped case, but more frequently they are rudely joined together. Occasionally, they are found in mounds or layers, four or five tiers of graves deep. The graves are usually six or seven feet long, a foot and a half to two feet wide, and eighteen inches deep; but graves of greatly varying sizes and shapes are found intermingled with those of more regular form. The children's graves are proportionately smaller. Frequently the same cist contains two or three skeletons, and is not more than three or four feet long, the bones having been placed in a pile irregularly within it, indicating that they were probably interred long after death, and after some intermediate preparation or ceremonies similar to the burial customs of some of the historic tribes."

The stone graves, unfortunately, are not so rich in artifacts as one might surmise from reading Doctor Jones's account. Professor Putnam in a personal letter writes us: "I think the great center of the stone-grave people was in the Cumberland Valley. There is where I did my work. Even there objects in the graves were not frequent. Certainly not more than one grave in twenty or more had any artifacts and not as many as that had pottery."

Mr. W. E. Myer, of Carthage, Tenn., whose archæological work along Cumberland river has been referred to, writes us: "I have found not more than one grave

[1] Putnam found in some of the cemeteries that the children's graves were separated from the graves of adults, one portion of the cemetery being devoted to the children. It was such grouping of the graves, he believes, that led some of the early writers to think there had been a race of pigmies in Tennessee.

[2] *Op. cit.*, p. 29.

in fifty contains artifacts." The reader of the description of our work along Tennessee river will note the very meagre returns from the stone graves there.

In southwestern Ohio, also, but few artifacts have been found in stone graves. We are told by Gerard Fowke:[1] "So far as may be judged from personal exploration and from the reports of others who have made investigations, not more than half a dozen graves out of several hundred opened, have yielded specimens of any sort."

Professor Putnam[2] reports that only eight pipes were found in several thousand stone graves opened in various sections of the stone-grave area in behalf of the Peabody Museum. He points out, however, that one may, at times, in stone graves find objects of surpassing rarity, and describes (in a personal letter) a fine deposit of rare flint implements obtained in central Tennessee,[3] by an agent working under his direction for Peabody Museum, hitherto undescribed in print, which much resembles the superb deposit of flints now in possession of the Missouri Historical Society.[4] This latter deposit, however, which was found in Humphreys County, Tenn., on Duck river, a few miles above Tennessee river, cannot be said absolutely to have come from a stone grave, though it probably was so derived, as set forth in Professor Moorehead's book.

While undoubtedly flints of wonderful form and workmanship have been discovered in Tennessee, it is almost certain that many flints of very unusual shape, some of which have been illustrated in various books, are the handiwork of well-known counterfeiters and fakirs[5] who reside in the western Kentucky and Tennessee region, and that genuine flints of unusual shapes in the stone-grave territory are not found nearly so often as readers of archæological works might suppose. Mr. Myer has found none on Cumberland river, and our lack of success in the discovery of such flints on the Tennessee lends further evidence as to their scarcity.

We quote by permission an extract from a letter by Mr. Myer:

"I find flint implements the hardest of all to determine counterfeits.

"It is my belief that a great many bogus relics are placed upon the market.

"In my own collection I found that I had many bogus pieces. I obtained them from men whom I had known for many years and had full confidence in. Even when I began to doubt them I felt I was doing them an injustice. I did not believe they knew enough or had the skill to make the flints.

"I was unable to get definite proof, but I became convinced I had been de-

[1] "Archæological History of Ohio," p. 406.

[2] Peabody Museum, Sixteenth and Seventeenth Annual Reports, p. 165.

[3] Exhibited at the Centennial Exposition, Philadelphia, 1876, and casts of which are in the National Museum, at Washington.

[4] Gerard Fowke, "Prehistoric Objects Classified and Described," Missouri Historical Society, Department of Archæology, Bulletin I. Warren K. Moorehead, "The Stone Age in North America," Vol. I, figs. 161, 162, p. 164 *et seq.* See also Thruston's interesting supplement to Chapter VII, *op cit.*

[5] The last letter received by us from our good friend, the late Gen. Gates P. Thruston, written shortly before his death, is very specific as to this counterfeiting and faking of flints. The fact, moreover, is well known in archæological circles.

ceived. It was a bitter pill to have to take out of my collection some of my most cherished specimens. I did it and am glad I did. Science wants the truth. The professional relic dealer somehow gets in touch with much doubtful stuff of very rare form."

An interesting feature of the archæology of Tennessee is its pottery, of which but little has been written except of that of the region centering around Nashville, on Cumberland river, where most of the pottery discovered in the State has been found. The earthenware of this region is similar to most of that of the Middle Mississippi region, whose approximate southern boundary seems to be Arkansas river—in all events west of the Mississippi such is the case.

The pottery of the Middle Mississippi region, while extremely interesting, is bizarre rather than artistic. The ware, shell-tempered, is coarse, thick and lacking in surface finish; forms are often asymmetrical; undecorated vessels abound. The interest in this ware lies mainly in its numerous curious effigy vessels, and in its polychrome decoration which, however, is less often met with in Tennessee than it is across the Mississippi.

For delicate pottery of artistic form, with highly polished surface, often bearing gracefully curved, and sometimes intricate, incised or trailed line-decoration, and seldom without ornamentation of some kind, one must, as a rule, seek farther south—in the Lower Mississippi region. A concrete example of this may be seen in Plate VIII of Thruston's work, where, in the upper left-hand corner, a vessel from the Lower Mississippi region is shown, while all the others are from the Middle Mississippi territory.

The pottery of middle Tennessee, while inferior to that of some parts of the Middle Mississippi region (the northern part of Arkansas, for example, with its "tea-pot" vessels, its head-vessels, its exceptional cases of incised decoration) far surpasses such earthenware as has been found along Tennessee river in Tennessee, if we except the rare examples of presumably a local culture near Chattanooga, to be described in this report.

We shall now turn from the archæology of the State of Tennessee in general to consider Tennessee river in connection with our archæological work upon it.

Tennessee river begins in eastern Tennessee, a short distance above the city of Knoxville, and is formed by the junction of French Broad and Holston rivers.[1] Continuing westwardly and southerly, somewhat below the city of Chattanooga, Tenn., it enters the State of Alabama, where it follows first a southwesterly and then a northwesterly course, and, bordering the State of Mississippi for about ten miles on one side, it again enters the State of Tennessee. Turning northward, the river flows first through Tennessee and then through Kentucky to its union

[1] In former times Tennessee river was regarded as beginning at Kingston, by the junction of the Clinch and Holston rivers. In the report of Col. S. H. Long, made in 1830, Tennessee river is regarded as beginning at the union of the Holston and the Little Tennessee. At present Tennessee river is considered as stated in the text. All this information we have from Major H. Burgess, Corps of Engineers, U. S. A., now stationed at Nashville, Tenn., who in so many ways has aided our expedition.

with Ohio river, at Paducah, Ky., a distance of 652 measured miles, following the course of the stream.

Tennessee river, which flows through rock and gravel, has not constantly changed its course as have some other southern rivers which pass through alluvial deposit.

Though showing ample evidence of aboriginal occupancy along its entire course, the Tennessee possesses but few aboriginal sites of importance. Its greatest mound (at Florence, Ala.), quadrangular, with flat top, doubtless domiciliary, is 42 feet in height. No other mound on the river approaches it in altitude. The principal,[1] and really only notable group of mounds on Tennessee river, is on the Battlefield of Shiloh, near Pittsburg Landing, Tenn., where seven interesting mounds, most of them quadrangular and probably domiciliary, testify to the former presence of an aboriginal town. The highest of these is about 15 feet, though in a description of the group which has been published, the height of this mound, by including part of the river bank, is made considerably greater.

Beginning at Hiwassee Island in eastern Tennessee, and continuing up the river to Lenoir City, a distance of 101 miles by water, in almost continuous sequence are groups of mounds, blunt cones in shape, few more than 10 or 11 feet in height and most much less than that. These mounds, erected for burial purposes, in all probability, contain, so far as is known, but few artifacts in connection with the burials, which are but sparsely encountered in them. They have been largely dug into in a limited way, by people having an exaggerated idea of the value of Indian objects, fostered by the presence of traders who themselves, or through agents, almost patrol the river.[2] Had anything of any consequence been found in all this digging in these mounds, it is certain that they all would have been torn to pieces long ago, since Tennessee river is thickly populated throughout its length and scarcely a mound on it is out of sight of some habitation.

No aboriginal cemeteries of any considerable size border the river, and sites marked by the presence of stone graves are comparatively few and of very limited extent. Although common report along the river tells of the great flood of 1867 (and of succeeding though less important ones), and describes the fields after its subsidence as showing slabs of stone, human bones, and artifacts, and although one hears of small groups of stone graves that have been plowed away within the memory of present inhabitants, it is unlikely the Tennessee valley, at best but the border of the stone-grave people, ever contained anything like the number of stone graves formerly found in central Tennessee. Had Tennessee river ever possessed stone-grave cemeteries similar in extent to those found farther north, they would have been noted and searched long prior to the great

[1] The group of mounds at Savannah, Tenn., described in the Smithsonian Report for 1870, p. 408 *et seq.*, has been largely dug away, now being within the limits of the town.

[2] Part way up the river, we were immediately preceded by a dealer; nearly from Chattanooga on our downward journey, a trader went ahead of us in a motor boat, seeking to buy Indian relics and posting notices as to their purchase. Other traders were encountered *passim*.

flood, as was the case in central Tennessee, whose antiquities have been described for nearly a century.

Herewith we present a map of Tennessee river showing the location of stone graves along its course, based on our own observation with one exception which carries the presence of the stone grave somewhat farther east than we found it.

The reader will note that the stone graves, that is to say burials made in connection with slabs or masses of stone, have, for convenience, been divided on the map into three classes: (*a*) the regular, enclosed burial or box-grave found most extensively and constantly in middle Tennessee; (*b*) the burial made on or under slabs or masses of stone but otherwise unenclosed; and (*c*) unusual forms.

It will be noted that, as one might expect, in the northwestern area of Tennessee river the box-grave predominates. Box-graves, however, as will be seen, were found by us to a limited extent in eastern Tennessee, and even, in an isolated case, on the most southerly part of Tennessee river, in Alabama, from which State no stone graves of any kind had been reported before, though their presence there had been conjectured by Cyrus Thomas.

Stone graves of other forms, also, were present along parts of Tennessee river in Alabama, and probably in a scattering way are, or were, along all the stream there.

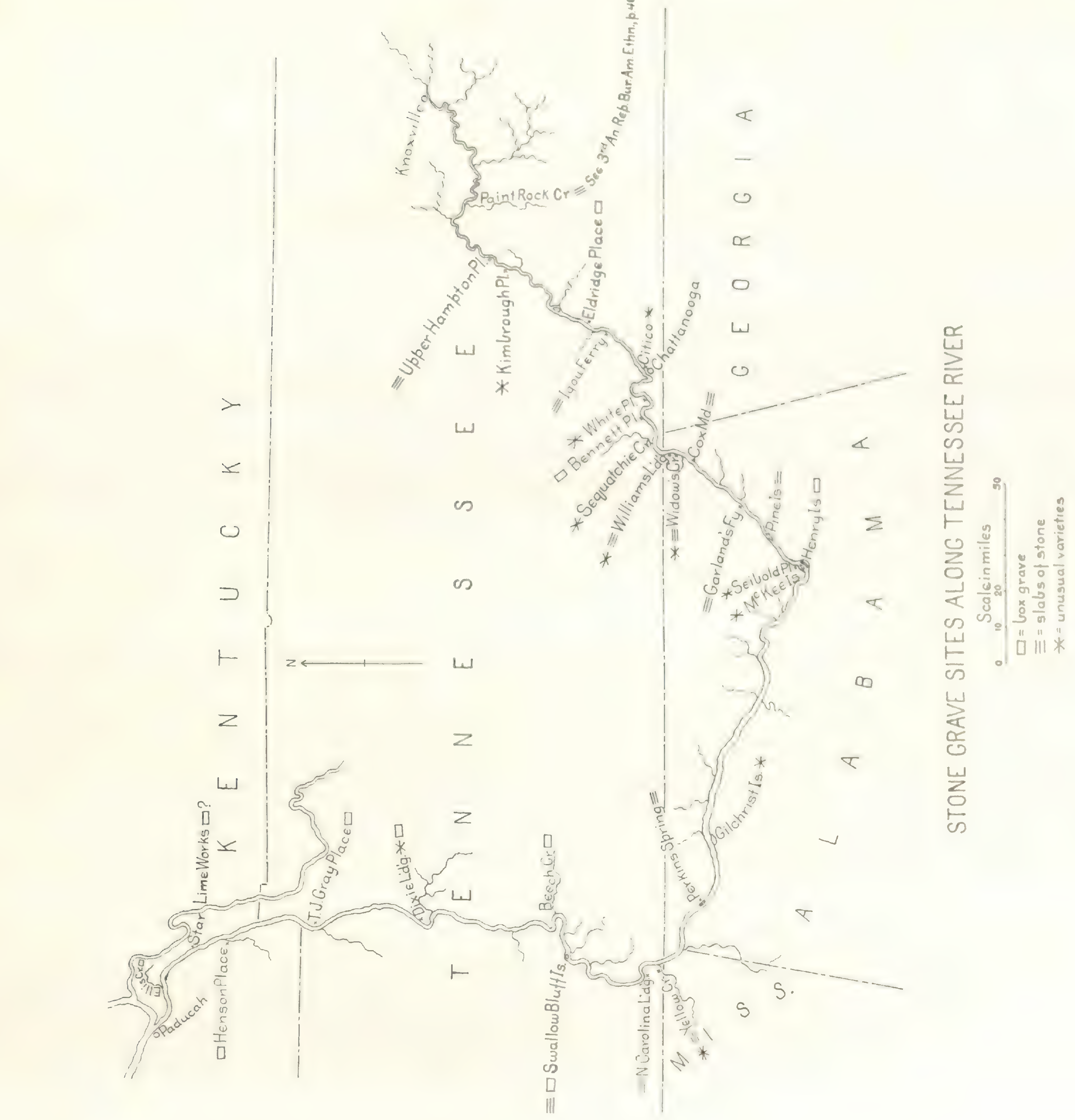
We may repeat that artifacts in the stone graves along Tennessee river, as the reader will see, are seldom encountered, and though objects of great interest have been found in stone graves elsewhere, the statement that these depositories of the dead anywhere are rich in aboriginal remains comes from those who have never investigated stone graves and who apparently write in ignorance of the facts.

Stone graves in any part of the country, it may be said, resemble a lottery: one hears of the isolated winners but not of the legions who drew blanks—and this applies in the main to aboriginal mounds, cemeteries, and burials of every kind throughout the country.

Often with stone graves, unenclosed burials were found by us along Tennessee river, though Professor Putnam informs us that in his investigations in central Tennessee, near Nashville, almost no unenclosed interments were found associated with stone-grave burials, either by himself or by Mr. Curtis who continued Professor Putnam's work there.

Along Tennessee river, as the reader will see, many stone graves, as stated, were not of the box-grave variety which in central Tennessee is almost exclusively found; and along all parts of Tennessee river many mounds and sites containing burials are without stone graves of any kind.

Comparatively little investigation of a serious character had been attempted along Tennessee river prior to the commencement of our own work. Here and there a mound or a group of mounds had been examined, but no systematic work on the stream had been done.


STONE GRAVE SITES ALONG TENNESSEE RIVER
Scale in miles
0 10 20 30
□ = box grave
≡ = slabs of stone
✳ = unusual varieties
KENTUCKY
TENNESSEE
GEORGIA
ALABAMA
MISS.
N
Paducah
Ellis Cr.
□ Henson Place
Star
Lime Works □?
T. J. Gray Place □
Dixie Ldg. ✳ □
Beech Cr. □
≡ □ Swallow Bluffs
≡ N Carolina Ldg.
Yellow Cr.
Perkins Spring ≡
Gilchrist Is. ✳
≡ Garland's Fy.
✳ Seibold Pl.
✳ McKee Is.
Henry Is. □
Pine Is. ≡
Cox Md. ≡
✳ ≡ Widows Cr.
✳ ≡ Williams Ldg.
✳ Sequatchie Cr.
□ Bennett Pl.
✳ White Pl.
≡ Lyou Ferry
Citico ✳
Chattanooga
Eldridge Place □
✳ Kimbrough Pl.
≡ Upper Hampton Pl.
Paint Rock Cr. ≡ See 3rd An. Rep. Bur. Am. Ethn., p. 481
Knoxville

In the Twelfth Annual Report of the Bureau of American Ethnology are accounts of the exploration of a few sites along Tennessee river in Tennessee and in Alabama.

In the Smithsonian Reports are accounts of (*a*) the exploration of the mounds near Citico creek,[1] Hamilton Co., in the outskirts of Chattanooga (1867, p. 401 *et seq.*); (*b*) the group of mounds at Savannah, Tenn., already noted (1870, p. 408 *et seq.*), and (*c*) the mounds on the Williams Farm, Hardin Co. (p. 416 *et seq.*).

In Catalogue of Prehistoric Works East of the Rocky Mountains, by Cyrus Thomas, are noted a number of mounds along Tennessee river, most of which have been referred to by authorities already cited. The exact location of some of these mounds is at present hard to determine, owing to change of ownership, a difficulty not easily overcome, however, in the case of mounds of moderate size not on some island or near a town or the union of streams.

General Thruston (*op. cit.*) speaks of the mounds at Savannah (p. 43), and refers to a group near Johnsonville, Tenn. (p. 46), which probably are the mounds at Dixie Landing, Humphreys Co., described by us. There are also references to various aboriginal artifacts found along Tennessee river, including two stone pipes, one from near Kingston, Tenn. (Fig. 85), the other from near Chattanooga (Fig. 101).

Practically no description of the archæology of northern Alabama, which includes part of Tennessee river, has been published hitherto.

For a description of Ohio stone graves not of the box-grave variety but of irregular forms (and it is irregular forms one finds as a rule in northern Alabama and in eastern Tennessee, as we know), consult Gerard Fowke, "Archæological History of Ohio," Chapter XI.

Tennessee river (as before stated, 652 miles in length) was investigated by us, practically through all of January, February, March, April, and November, 1914, and January, February, March, and April, 1915, the stream having been thrice gone over in the interest of our investigation: once, as we shall detail, by our agents, and twice by our expedition—the journey up and the journey down.

The whole river was carefully searched in advance of our coming by Mr. J. S. Raybon (who later commanded the steamboat during the period of our archæological work on Tennessee river) and a companion, in the summer of 1913, and by them the exact situation of mounds and dwelling-sites was determined, with the names and addresses of their owners, to whom requests for permission to investigate were sent by us.

In former years, as a rule, permission has been readily obtained, but while many owners along Tennessee river sent affirmative replies, some refused, while a fair proportion failed to respond, even though addressed a second time. Such of these as were called upon by us and found at home (absentees were numerous and some lived beyond our reach) usually gave consent.

[1] Another Citico creek, which empties into Little Tennessee river and has a mound near it, is described in the Twelfth Annual Report of the Bureau of American Ethnology.

A few refusals were based on the fact that former diggers (doubtless treasure-seekers, traders, or irresponsible natives) had not conformed to their agreements, but had decamped, leaving excavations unfilled and fields in disorder, behavior for which we (and one could not otherwise expect) had to suffer.

We believe the refusal of some of the owners to permit us to dig was not based on the firm belief in the presence of buried treasure in the mounds and sites, which prevails all over the South (and probably everywhere else where aboriginal remains exist), but on an exaggerated idea of the value of Indian objects. Our offer to hand over to owners all treasure unearthed by us on their properties has elsewhere been to some extent an inducement[1] to grant permission to explore, and doubtless had similar influence on Tennessee river, since most of them thus were having done gratis by others what for years they had been thinking of doing themselves at considerable cost.

Seldom has faith been more misplaced than is that of the class of owners in question in the value of the contents of their mounds and sites. The presence of traders in Indian artifacts along the river and the receipt of circulars from traders in large cities is likely, of course, to foster an exaggerated belief in the value of aboriginal relics. In point of fact, however, dealers on Tennessee river seldom obtain anything other than surface finds, "Injun spikes," "areheads" (arrowheads), and celts, in addition to what some of them at least are seeking, namely, broken masses of flint, rejects and fragmentary points, from all of which counterfeits of Indian relics and freaks of the fakirs' fancy can be manufactured.

These owners are still further influenced by the exaggerated tales current among the inhabitants along the river as to the prices obtained for Indian relics. One person recounted in all seriousness to us how a man having dug in a site (where we found nothing of any consequence) had obtained curiosities which he had sold for an immense sum. The fact that this individual had died poor shortly afterward did not seem to shake the person's belief in his story.

Although in the case of Tennessee river it has been our intention to enumerate all sites[2] and mounds (of course, investigating them when possible), it is highly probable, owing to the great number along the stream, that many escaped the search of our agents, supplemented later by our own.

The names of owners of all mounds, whether permission to investigate has been accorded or not, have been introduced into this report more clearly to establish the identity of the mounds and also for the reason that a forthcoming publication by the Bureau of American Ethnology, which will draw to a considerable extent upon our work, will, when possible, include the names of owners. When, in our report, the withholding of permission to dig has been noted, this

[1] Some owners, of course, permit investigation through interest in science and with no belief in buried treasure.

[2] Some small dwelling-sites, evident through superficial debris, when investigated and found probably to be without burials, have not been noted.

has been done by us to explain the absence of investigation on our part and for no other purpose.

Although in our "Certain Aboriginal Mounds of the Georgia Coast"[1] we have discussed various forms of aboriginal burial, it may afford information to some to have the matter presented again.

The extended burial, as its name implies, is at full length, usually on the back, very exceptionally face down.

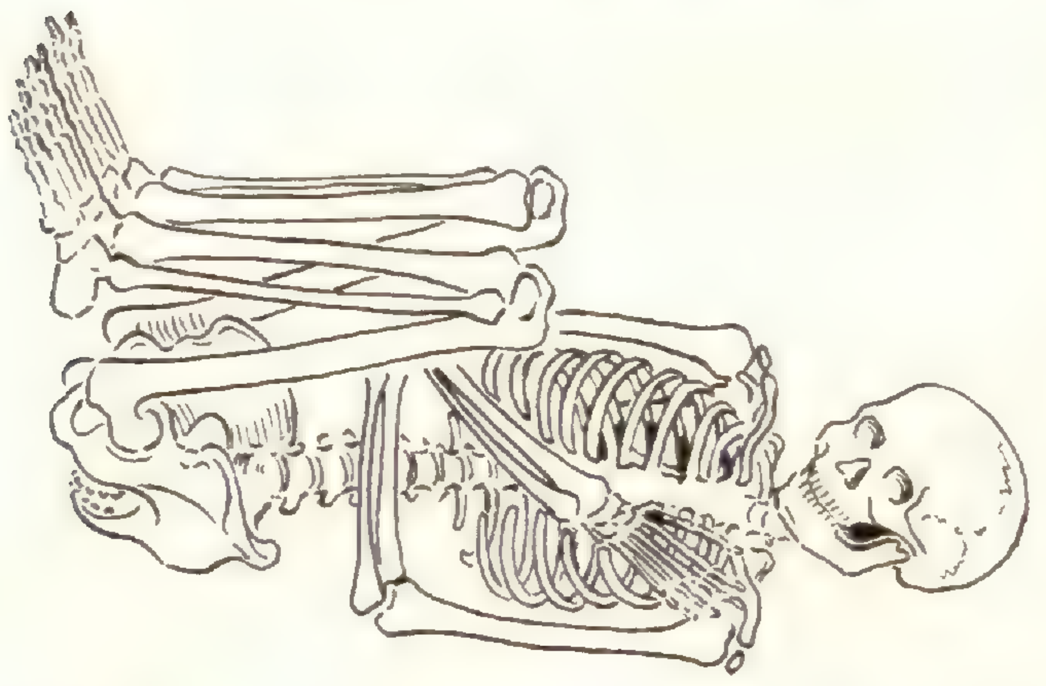


FIG. 1.—A skeleton closely flexed to the right. The trunk and extremities are in the same plane.

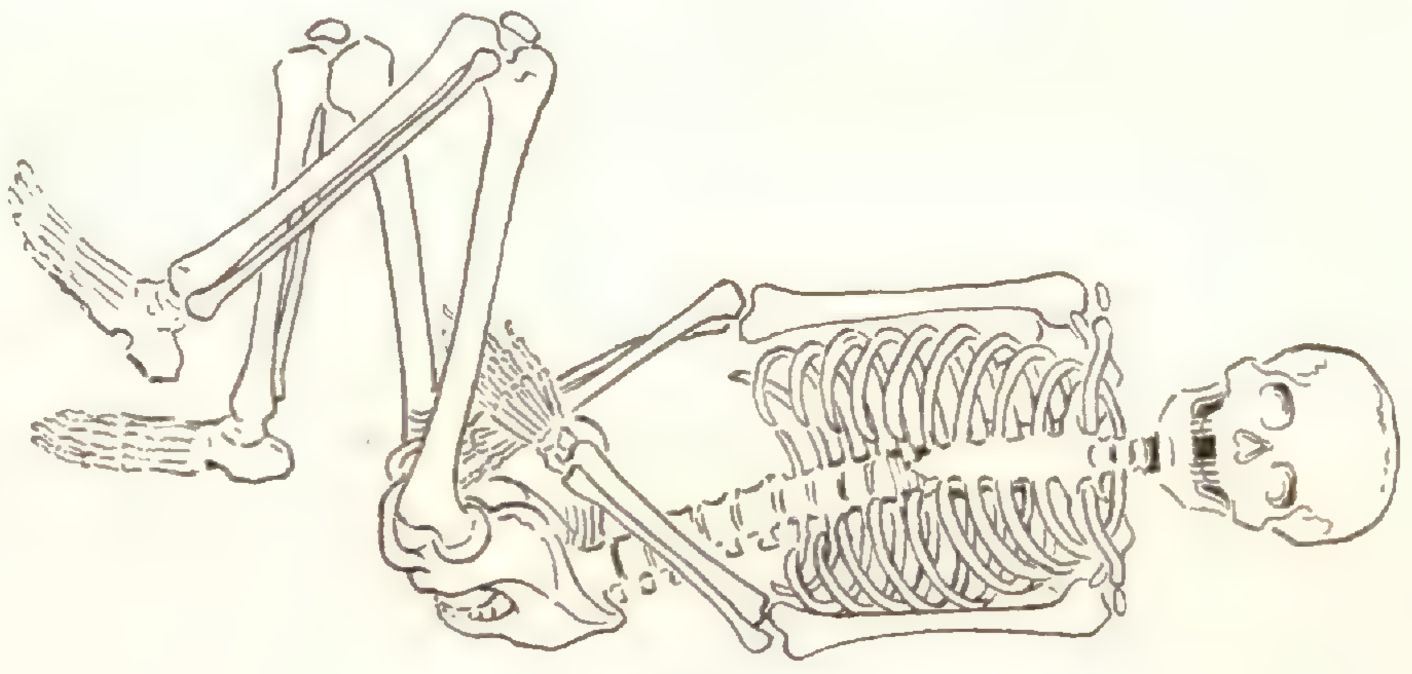


FIG. 2.—A skeleton partly flexed to the right. The trunk and extremities are in the same plane.

The skeleton closely flexed *to* the right or the left, lies with the upper part of the trunk on the back, the lower extremities drawn up close to the body, the legs back against the thighs, these extremities directed to the right or the left, as the case may be, as shown in Fig. 1, in which a burial closely flexed *to* the right is represented.

The burial partly flexed *to* the right or the left is similar to the closely-flexed burial just described, with the exception that the thighs are less closely flexed and the legs are not drawn up immediately against the thighs. A burial partly flexed *to* the right is shown in Fig. 2.

A skeleton closely flexed *on* the right or left lies with the trunk on the side, the extremities closely flexed against the body, to the right or the left, as shown in Fig. 3, in which a burial closely flexed *on* the right is represented.

A burial partly flexed *on* the right or the left has the trunk on the side, the thighs less closely flexed against the trunk, the legs separated from the thighs to a lesser or greater extent, as may be seen in Fig. 4, which illustrates a skeleton partly flexed *on* the right.

The reader will note that the expression right or left applies to the skeleton and not to the right hand or to the left hand of the observer who is facing it.

The bunched burial sometimes consists of loosely piled bones with no attempt at arrangement, and sometimes of masses of long-bones lying parallel, with skulls placed on top or at the side. A good example of the latter kind is shown in our "Certain Mounds of Arkansas and of Mississippi,"[2] Fig. 1.

[1] Journ. Acad. Nat. Sci. Phila., Vol. XI, p. 6 *et seq.*

[2] Journ. Acad. Nat. Sci. Phila., Vol. XIII.

The burial in a sitting position, so often reported by novices, is very rarely[1] encountered, if we may judge from many hundreds of burials noted in our experience, provided the idea intended to be conveyed is that of a skeleton placed in a sitting posture, upright, in the ground.

If the skeleton in question lies in the position of one seated, who has been pushed over on the side, then it is simply a flexed burial and nothing else, for when one is in a sitting position the trunk is vertical.

Human remains in the mounds and sites along Tennessee river are, as a general rule, much decayed and consequently very fragmentary, sometimes being indicated only by merest traces. Wishing to avoid repetition of details, we have not in each instance described in this report the condition of the remains encountered, but where they have been in a fair state of preservation, the fact

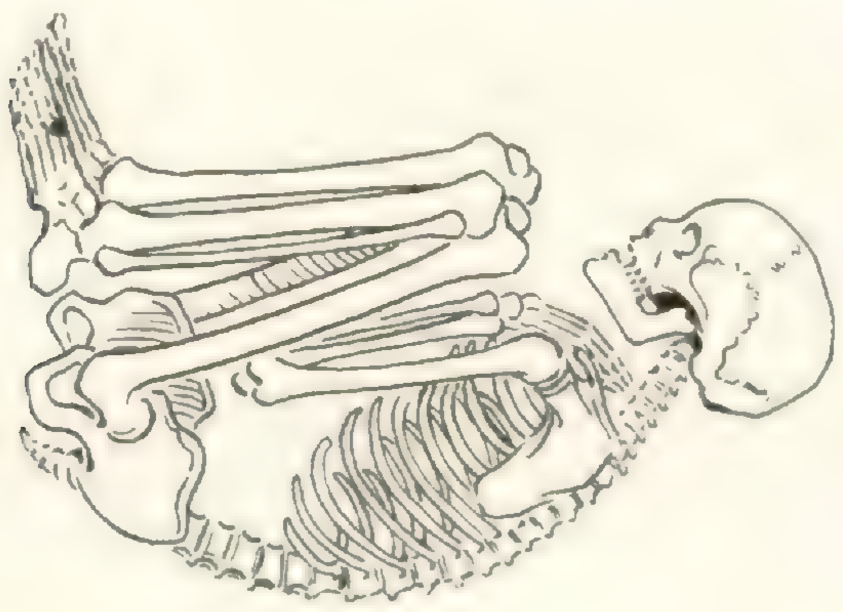


FIG. 3.—A skeleton closely flexed on the right. The trunk and extremities are in the same plane.

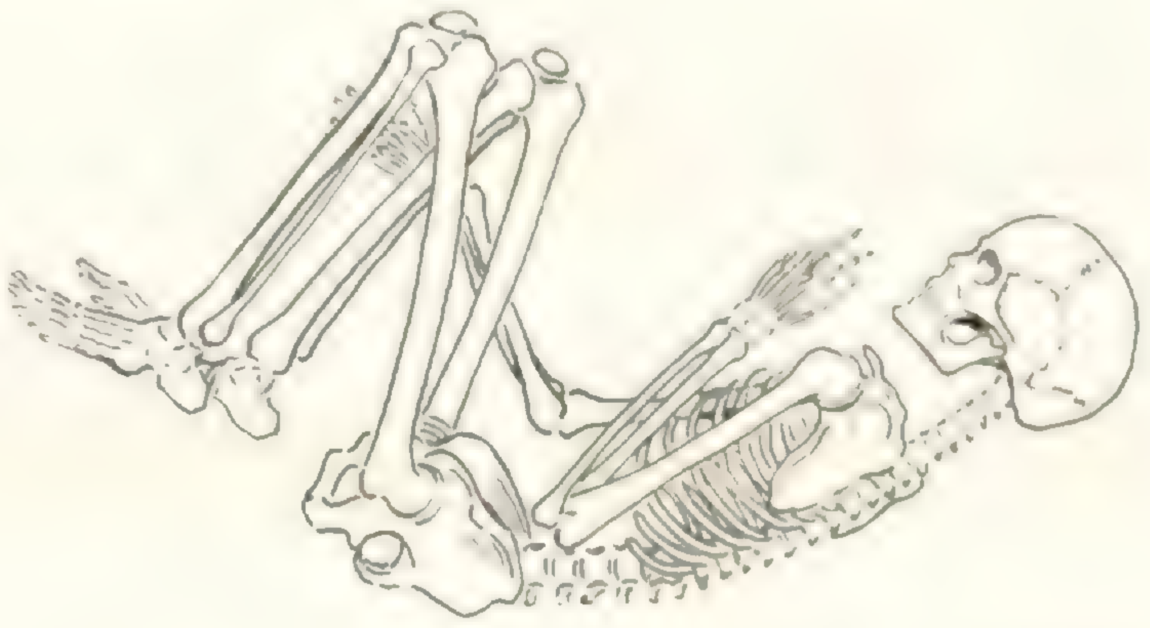


FIG. 4.—A skeleton partly flexed on the right. The trunk and extremities are in the same plane

usually has been noted. When the burial is discovered, the depth from the surface is recorded, and, as given, is to the upper surface of the bones. Consequently as the remains usually are crushed, five or six inches added to the given depth would represent the maximum depth of the burial. All skeletons, when enough remains were found to permit determination, when not otherwise described, were of adults.

Thirty skulls, in a condition to preserve, with some other bones, were found by us and sent as a gift to the United States National Museum, where they have been received (accession 58353) and examined by Dr. Aleš Hrdlička, curator of the Division of Physical Anthropology in that institution.

Doctor Hrdlička has determined that the crania obtained by us at Leadbetter and Prevatt's Landings, two neighboring sites in western Tennessee, are of the Algonquin type and differ from others found in our search along Tennessee river.

It has been considered best that no paper on the crania found by us on Tennessee river be prepared by Doctor Hrdlička in connection with this report, it

[1] We are told by a prominent investigator that in all his experience he has never encountered bodies buried in a sitting or squatting or crouching position.—Gerard Fowke, "Antiquities of Central, and Southeastern Missouri," p. 2, Bulletin 37, Bureau of American Ethnology. Burials of this variety, though most exceptional, have been found by Professor Putnam; and by us, as readers of our account of the Hampton Place, Hamilton County, Tenn., may see.

being regarded advisable to await results from our future work in regions bordering the scene of our latest investigation that a wider field for comparison may be available.

All pathological specimens obtained by us along Tennessee river have been given to the Army Medical Museum, Washington, D. C.

Dr. M. G. Miller accompanied the expedition, as anatomist, throughout the investigation of Tennessee river, as has been the case during all our archæological work in the South, and has assisted in putting this report through the press.

Mr. S. G. Weir, with us for the fourth and fifth seasons as assistant, lent efficient aid in many ways.

The thanks of the Academy are tendered Major H. Burgess, Corps of Engineers, U. S. A., stationed at Nashville, Tenn., for much valuable information and for lists of mounds and sites, obtained by him from officials under his direction and covering the entire river; to Prof. Frederic W. Putnam for careful revision of this introduction and for many valuable suggestions; to Prof. F. A. Lucas of the American Museum of Natural History, New York, and to Dr. G. S. Miller, Jr., of the United States National Museum, for determination of the bones of lower animals; to Dr. H. A. Pilsbry and Mr. E. G. Vanatta for identification of shells; to Mr. F. J. Keeley[1] for determination of minerals and rocks; to Dr. H. F. Keller for chemical tests; to Mr. Charles C. Willoughby for much valuable assistance; to Miss H. N. Wardle for aid with the index; to Mr. F. W. Hodge for literary revision of the report.

The Academy also warmly thanks the owners of mounds and aboriginal dwelling-sites, who so kindly placed them at its disposal for investigation, and assures them that their courtesy is most fully appreciated.

All mounds and dwelling-sites are described in order ascending the river, though the investigation, while usually, was not always, made in this way.

Measurements in this report are approximate; reductions are linear.

The conchshell so often referred to in connection with aboriginal handiwork, formerly called *Fulgur* by conchologists and by us in all our writings, is now known as *Busycon* and is so referred to in this report.

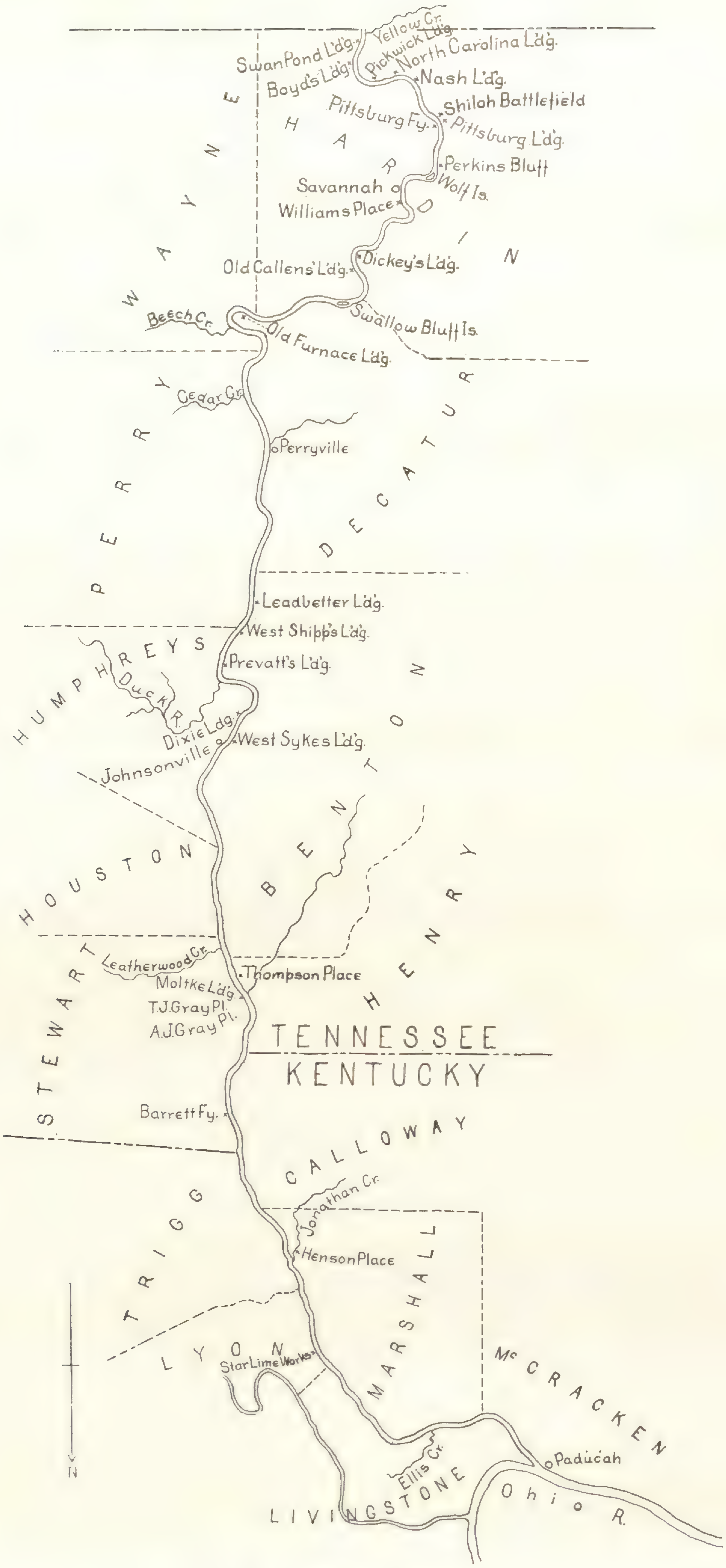
[1] Slides for microscopic examination, for obvious reasons could not be furnished Mr. Keeley, hence exact determination cannot be guaranteed in all cases, as otherwise could have been done.

PART I.

Tennessee River in Kentucky and in Western Tennessee.

Mounds and Sites.

Mound near Ellis Creek, Livingstone County, Kentucky.
Cemetery near the Star Lime Works, Lyon County, Ky.
Mounds on the Henson Place, Marshall County, Ky.
Mound near Barrett Ferry, Stewart County, Tennessee.
Mounds on the A. J. Gray Place, Stewart County, Tenn.
Cemetery on the T. J. Gray Place, Stewart County, Tenn.
Dwelling site on the Thompson Place, Henry County, Tenn.
Mounds near Leatherwood Creek, Stewart County, Tenn.
Dwelling-site on the Sykes Place, Benton County, Tenn.
Mounds and Dwelling-site near Dixie Landing, Humphreys County, Tenn.
Dwelling-site at Prevatt's Landing, Benton County, Tenn.
Mound near West Shipp's Landing, Benton County, Tenn.
Dwelling-site at Leadbetter Landing, Benton County, Tenn.
Mounds opposite the mouth of Cedar Creek, Decatur County, Tenn.
Dwelling-site near mouth of Beech Creek, Wayne County, Tenn.
Mound near Old Furnace Landing, Decatur County, Tenn.
Mounds on Swallow Bluff Island, Decatur County, Tenn.
Mound at Old Callens' Landing, Hardin County, Tenn.
Mound near Dickey's Landing, Hardin County, Tenn.
Mounds on the Williams Place, Hardin County, Tenn.
Mounds at Savannah, Hardin County, Tenn.
Mounds opposite Wolf Island, Hardin County, Tenn.
Mounds near Perkins Bluff, Hardin County, Tenn.
Mound near Pittsburg Ferry, Hardin County, Tenn.
Mounds near Pittsburg Landing, Hardin County, Tenn.
Mound near Nash Landing, Hardin County, Tenn.
Mounds below North Carolina Landing, Hardin County, Tenn.
Mound near North Carolina Landing, Hardin County, Tenn.
Dwelling-site near Pickwick Landing, Hardin County, Tenn.
Mound near Boyd's Landing, Hardin County, Tenn.
Mound near Swan Pond Landing, Hardin County, Tenn.
Mounds near the mouth of Yellow Creek, Hardin County, Tenn.



MAP OF TENNESSEE RIVER
IN KENTUCKY AND WESTERN TENNESSEE

Scale in miles

0 5 10 20 30

1915

MOUND NEAR ELLIS CREEK, LIVINGSTONE COUNTY, KENTUCKY.

In woods belonging to Mr. W. F. Buford, who lives nearby, was a mound of loamy clay, about one mile in a northerly direction from the union of Ellis Creek with Tennessee river. This mound, which had undergone considerable disturbance previous to our coming, was two feet in height. Its length and breadth were respectively 64 and 38 feet. On the surface lay a number of slabs of silicious rock, the largest being about 2 feet by one foot, with a maximum thickness of 3 inches, and was about as large as any subsequently found by us in the mound.

Five badly disturbed stone graves and two complete ones, all of the box variety, were encountered by us in an investigation which included a large portion of the mound.

Burial No. 2 had its upper slabs about one foot below the surface of the mound. These slabs, which were in two layers, were not found evenly placed, and presumably had undergone disturbance either through the settling of the soil or on account of roots of a tree, which had entered the grave. The supporting slabs at the sides, of a single thickness, were not vertical but sloped inward, and while the margins of some of the upper slabs projected above the general level, others had fallen into the grave. The grave, which was without slabs on the bottom, was somewhat contracted toward the upper part. Its inside measurements were: width, at the top, 10 inches; at the bottom, 21 inches; depth, 14 inches; length, 6 feet 5 inches. The grave lay ESE. and WNW.

The skeleton, traceable by friable fragments (the greatest, four or five inches in length) and a few teeth, evidently had been extended, heading eastward. Near where the skull had been was a pendant of indurated clay, originally copper coated, having on one side a deep groove. Also near the head, together, were what seems to be a claw represented in wood and a perforated object of bone partly decayed, hollowed out on one side perhaps to serve as a socket for the claw, which shows no perforation or groove for independent attachment. Both these objects had been overlaid with sheet-copper whose salts had preserved a small piece of matting found with them. In the grave also, but perhaps of accidental introduction, were several chips of flint.

Burial No. 3 was without trace of bone. The grave, whose upper slabs lay one foot below the surface of the mound, was in outside measurement: length, 3 feet 8 inches; width, 1 foot 6 inches; height, 14 inches. It extended NNW. and SSE. This grave, which had not suffered disturbance as had the other, showed an effort had been made to keep an even upper margin for the slabs at the sides in order to have those on top as level as possible. The slabs, however, as in Grave No. 2, had no uniformity of size and but little in shape, some being almost triangular, though a tendency could be noted, perhaps, to have the stones roughly oblong. Although some care had been taken to protect the burial, and in some instances slabs five or six inches square had been used, presumably to cover

openings, other openings remained, and through these soil had entered the grave.

This grave, without slabs at the base, was covered in double thickness, the upper layer being composed of five slabs, and four fragments to act as stop-gaps, the under layer having four slabs and three fragments. On one side were three large slabs, while the opposite side was made up of seven smaller slabs and four fragments. At each end was a single slab.

In part of a grave which had been left by previous diggers who were said to have been treasure-seekers and whose methods of search were not such as investigators employ, was a group of five mushroom-shaped objects of earthen-

Fig. 5.—Trowel of earthenware. Mound near Ellis Creek, Kentucky. (Full size.)

ware, of a kind now believed to have served as tools in the making of pottery vessels, and which are described and figured by Jones,[1] Thruston,[2] and Holmes.[3] One of these tools, whose handle terminates in a rude representation of an animal's head, is shown in Fig. 5. With these tools, the largest of which is 4.8 inches in diameter and 2.75 inches in height, was an object of indurated clay, somewhat resembling a semilunar knife in shape, though its capacity for cutting must have been limited.

Cemetery near the Star Lime Works, Lyon County, Kentucky.

On high ground immediately back of the Star Lime Works, formerly in woods but now partly in cleared ground, in property belonging to Mr. Crit Nickell, living nearby, are the remains of a small stone-grave cemetery which has been

[1] *Op. cit.*, p. 143.
[2] *Op. cit.*, p. 161 *et seq.*, Fig. 65.
[3] 20th An. Rep. Bur. Am. Ethn., p. 99 *et seq.*, and Pl. XXXV.

dug into for many years and recently has been in part plowed over. Groups of slabs lately plowed up were seen by us on the field and other slabs lay in the adjoining woods. Careful prodding by us all over the ground failed to come upon stone graves. There is no history of artifacts having been found in the graves at this place.

Mounds on the Henson Place, Marshall County, Kentucky.

On property belonging to Mr. W. A. Henson, who lives upon it, are a number of mounds which may be reached from the river by going in from the mouth of Jonathan creek, about one mile in a southerly direction, though the distance by the road is somewhat greater. We were informed by Mr. Henson that these mounds, all of which had been under cultivation for a long time (the Henson property having been in the family for one hundred years), had no history of discovery of artifacts or bones.

A short distance from the road, near together, are two mounds, the larger of which, with flat top, very irregular in outline owing to cultivation, is 11 feet 6 inches in height. Its length is 265 feet. Measurements of width would vary considerably; one taken near the middle of the mound gave 142 feet. The smaller mound, also with flat top, evidently had been quadrangular. Its height is 8 feet 6 inches; its basal diameters, 118 and 128 feet. Farther back in the field, but in full view from the mounds just described, is another which has lost much in height through cultivation, as shown by denuded roots of trees upon it. Its height is 5 feet 6 inches; its basal diameters, 110 feet and 180 feet. Other rises in the field have been largely plowed away. As these mounds, in our opinion, had been domiciliary, they were not accorded a thorough investigation. Trial-holes made in them yielded no positive result.

Near the two larger mounds, but across the road, in woods, are five or six humps or knolls, each from 3 to 4 feet in height and about 40 feet in diameter of base. These small mounds had been much dug into, some having five or six holes, left presumably by treasure-seekers. We were informed that human bones had been found by diggers some time ago, and in our investigation, which covered about all parts left of the mounds, we came upon the remains of a stone grave, though no other evidence of burial in the mounds was encountered.

Mound near Barrett Ferry, Stewart County, Tennessee.

On property belonging to Mr. William Vinson, who lives upon it, is a mound in a cultivated field, about one-half mile NNW. from Barrett Ferry Landing. According to Mr. Vinson, this mound has been plowed over for nearly seventy-five years, and so far as he knows, nothing in the way of bones or artifacts has been taken from it, though the mound has been greatly reduced in height during cultivation. The mound, which no doubt is greatly spread, is roughly circular as to the base, the present diameter being about 100 feet. The height is 4.5 feet. Our investigation showed this mound to have had fireplaces at various levels, but yielded neither bone nor artifact.

Mounds on the A. J. Gray Place, Stewart County, Tennessee.

About one mile in a northerly direction from Moltke, a settlement on the river, are two mounds near together in a cultivated field, in full view from the road leading from the landing at Moltke. These mounds are on the property of Mr. A. J. Gray, whose residence is in sight from them.

The mounds have been plowed over for a long time and their height evidently has been much reduced. Midden debris, including fresh-water shells, fragments of coarse pottery, and broken implements of flint, is abundant on their surface and on the field which surrounds them. A small bi-cave stone, a disc wrought from a fragment of a pottery-vessel, a similar disc centrally perforated, 1.5 inch in diameter, several arrowheads of flint, two agricultural implements of the same material, one rather rude, several flint knives, were picked up on the surface.

The easternmore of the two mounds, 6 feet in height at the time of our visit, had a diameter of 96 feet. Trial-holes in its central part came upon no sign of burials, but among others that were put down near the margin of the mound, one uncovered a skeleton extended on the back, lying on a fireplace about 22 inches below the surface. This skeleton, which showed no trace of fire and was not enclosed in slabs, was much decayed and fragmentary. Near the skull was a pot about 3 inches in height, on which two loop-handles had been, resting in the fragments of a bowl which had possessed handles similar to the others. Near these vessels, which are of coarse ware, was a bowl with an extension from one side to represent the beak of a shell—a common form for earthenware in the Middle Mississippi region.

At the same fireplace, but not near enough to the skeleton to connect them with it, were fragments belonging to several vessels of earthenware, but not the full complement. Among these was a well-modeled effigy of a human head which had formed part of a bowl.

A smaller mound, 3 feet high and 75 feet in diameter, was on a ridge giving the mound an appearance of increased height on one side. Our digging yielded no trace of interments.

Near this mound the level ground is very dark and gives every appearance of long occupancy in the past, but as the field was planted with clover, our digging was of necessity limited. Some trial-holes which we kindly were permitted to put down came upon no trace of burial, though a flint spade was unearthed from one of them.

Cemetery on the T. J. Gray Place, Stewart County, Tennessee.

This property, adjoining that of Mr. A. J. Gray and belonging to Mr. T. J. Gray, who lives upon it, includes a field immediately south of the A. J. Gray Place in which is a ridge extending N. and S., thickly strewn with slabs of shale, which according to Mr. Gray, the owner, had been plowed up in course of cultivation of the field. Very many others, we were told, had been gathered and

hauled away from this ridge, which proved to be what was left of a small stone-grave cemetery.

Of the remaining graves, we opened nineteen, all of the regular box variety, and then, in view of the disturbance that had been wrought by cultivation, which precluded obtaining complete data, and of the fact that no artifact was found in any of the graves, we discontinued work, hoping later to come upon a more representative site, though in point of fact we found no stone-grave site equally desirable on the whole Tennessee river.

The nineteen stone graves which were encountered singly or in groups, but never more than five together, were none more than a few inches below the surface and had, in most cases, been disturbed to some extent by the plow. Their length ranged between 6 feet 7 inches and 19 inches, inside measurement.

The graves had been placed as follows: N. and S., 1; NE. by N., and SW. by S., 1; ENE. and WSW., 3; E. by N. and W. by S., 5; E. and W., 8; E. by S. and W. by N., 1.

Human remains, when found at all, were badly decayed, sometimes mere traces, and in the case of children no more than crowns of teeth—sometimes but one or two. Once or twice bones of adults were distinguishable throughout the burial, but even these were friable and past all chance of preservation. In eight graves no trace of bones was apparent. Of these, five had belonged to children,[1] two to adults, and one had been disturbed by the plow so that the size was undetermined.

Of the eleven graves containing human remains, eight had belonged to adults and three to children.

Nine burials had headed in a westerly direction and one toward the north, the determination at times being based on the position of teeth or of fragments of skull in the grave. One grave containing minute traces of bone afforded no indication of the former direction of the head. Its size, however, indicated the grave of an adult.

As to the arrangement of the body in the grave, no determination was possible in the case of children. Where it could be made in the graves of adults, the burial had been at full length, though in one instance the skeleton which in this case was clearly distinguishable, was considerably out of position as to the upper part of the body, the bones of the lower extremities, however, being in order. This disarrangement, moreover, was not attributable to contact with the plow, as the bones had been amply protected by the slabs of the grave.

The stone graves at this place, all of which were of the box-grave variety, had been made with considerable divergence as to minor detail. Sixteen had a flooring of slabs, while three were without this feature. The stone flooring was invariably of one thickness, though some of the graves had double thickness on top and at the sides, and, in one instance, even at the head and the foot.

[1] We attribute these graves to children, fully realizing the fact that some small stone graves contained disjointed bones of adult skeletons (see Thruston, *op. cit.*, p. 29), but these graves at the T. J. Gray Place were considerably smaller than are the ones referred to by Thruston and other writers.

Apparently the graves had first been dug and then enclosed interiorly with slabs. Then, perhaps to support the slabs additionally, the grave was filled in part with soil, after which the slabs for the floor were placed in position in the cases where they were used. For example, in one case, a side slab nearly 20 inches in height, belonged to a grave about 9 inches in depth, inside measurement. All the graves, however, did not show so marked a difference between the height of the slabs at the sides and the depth of the grave.

The slabs used for flooring were from one to two inches in thickness; therefore, as there was usually a space under the floor of the graves, enclosed by the side and end slabs, it occurred to us that possibly burials or artifacts might have been placed in these spaces also. Consequently all such were dug out with a trowel, with the utmost care, without, however, finding bones or artifacts with the exception of a single fragment of pottery, which probably got in accidentally with the soil.

As the reader perhaps is not familiar with the minutiæ of stone graves, a description of some from this place will be given in detail. The slabs are of shale, probably from the hillside a few yards distant. All graves had become filled through percolation of the soil.

Burial No. 4, extending ENE. and WSW. The top, in two layers, considerably overlapped the sides of the grave. The upper thickness of the top was composed of four slabs; the under layer, of five slabs and a fragment probably used as a stop-gap. One side had three slabs and a fragment, while the other side had but two slabs. The floor, about eight inches of which was uncovered at one end, was made up of five slabs. One upright end of the grave was a single slab; two narrow ones had been placed at the other end. The inside measurements of this grave were: length, 2 feet 10 inches; width, 1 foot 5 inches. The depth was 4.5 inches, though one of the side slabs had a height of 14 inches.

Burial No. 7, placed E. and W., seemed undisturbed. The top was made up of five slabs and one small fragment in a single layer. At one side were three slabs and five fragments, a single thickness; the other side, in two layers, was made up of eight slabs and two fragments. The head of the grave, in double thickness, had three slabs. The foot, also double, was composed of three slabs and a fragment. The floor was paved with six slabs and two small bits of stone. This grave, 3 feet 8 inches by 11 inches, had a depth of 6 inches, all inside measurements. The only human remains encountered consisted of the crown of a child's molar tooth, in the western end of the grave.

In the two burials described numbers of small slabs were used in enclosing the graves, but sometimes large slabs were employed. One of the largest graves found at this place had but two slabs to complete its entire length.

The foregoing was written after a visit to the T. J. Gray Place on our way up the river. On the way down we made further investigation there in the hope of finding a stone grave or graves symmetrical and complete to a degree to make illustration desirable, which we did not consider we had done at the time of our first visit.

On our second visit we were less exacting, and in one instance, at least, enjoyed better fortune.

Among the wreckage of graves, all near the surface, we came upon the following stone box-grave burials worthy of description, besides a number of others which were too badly disturbed to merit it.

Burial No. 20, a beautiful little box-grave 3 feet 1 inch long, 1 foot 8 inches wide, and 10 inches in height, outside measurement. This little grave, which extended NE. by E. and SW. by W., had been constructed of slabs of sandstone

Fig. 6.—Burial No. 20. Stone box-grave of a child, 3 feet 1 inch by 1 foot 8 inches. T. J. Gray Place, Tenn.

and of claystone in one and two thicknesses, small masses having been placed here and there to cover every opening so that no part of the grave was unprotected. Among the smaller stop-gaps were two water-worn bowlders of silicious material, each about the size of a man's foot. This interesting grave, which we show in Figs. 6, 7, intact and as it appeared after the removal of the covering slabs, had an inside measurement of 2 feet 5 inches by 10 inches, by 9.5 inches in depth, and possessed a flooring of slabs, as did all the entire graves investigated by us at the time of our second visit. The child's bones that doubtless once rested in this grave presumably had long since decayed away.

Burials Nos. 21 and 22, two graves parallel throughout, about one foot apart, each 7 feet long and 2 feet 3 inches wide, approximately. The tops had been

plowed away. These graves ran easterly and westerly and extended across the narrow rise in the field in which the stone graves were, as did all the graves found by us on this second visit, the skeletons in them, where any traces remained, having the heads at the western end. The two burials under description, like all determined by us at this place, had been at full length on the back.

Fig. 7.—Burial No. 20, the covering of the grave removed. The skeleton had disappeared through decay. T. J. Gray Place, Tenn.

Burials Nos. 23, 24, 25, 26. These four box-graves in a group had, with one exception, lost their covers by contact with the plow. Two of them, 6 inches apart, were parallel throughout. Two other graves, in line with the former ones, were not side by side to their full extent, an end of each projecting beyond the corresponding end of the other. Burial No. 23, the one shown in Fig. 8, was 7 feet 10 inches long by 2 feet 8 inches wide, its inside measurements being 5 feet 10 inches by 1 foot 6 inches, by 11 inches in depth. The foot-stone of this grave seemed to have been in common with a grave extending in line from it. The bones in these four graves, though traceable throughout, were badly decayed.

Burial No. 27, a skeleton represented by fragments, in a box-grave, as were or had been all at this place, 7 feet by 2 feet 6 inches over all, extending due E. and W. (Fig. 9). In the illustration it is interesting to note a slab placed above the others in order to cover a space otherwise left unprotected. The inside measurement of this grave was 6.5 feet by 1 foot 7 inches, by 1 foot in depth.

Fig. 8.—Burial No. 23. Stone box-grave, 7 feet 10 inches by 2 feet 8 inches. T. J. Gray Place Tenn.

Fig. 9.—Burial No. 27. A stone box-grave, 7 feet by 2.5 feet. T. J. Gray Place, Tenn.

Burial No. 28, a grave running due E. and W., 5 feet 8 inches long by 1.5 foot wide, the inside measurements being 5.5 feet by 1 foot 2 inches, by 10 inches in depth (Fig. 10). In this grave most careful search failed to discover any trace of human remains.

In none of the stone graves at this place was so much as a chip of flint encountered.

Crossing the road which borders the field in which the stone graves were, one comes to the foot of a hill near the top of which, but still on a gentle slope, is a

Fig. 10.—Burial No. 28. Stone box-grave, 5 feet 8 inches by 1 foot 6 inches. T. J. Gray Place, Tenn.

mound slightly more than 7 feet in height, measured from the side highest on the slope, and having diameters of 58 feet and 43 feet. This mound (A), which extends NE. and SW., has on top a flat ridge 27 feet long and 4 feet in width.

About 85 yards SSE. from Mound A is another mound (B) in the shape of a ridge extending NNE. and SSW. Its height is 10 feet; its basal length and width are 110 feet and 48 feet, respectively. Its top, which is flat, is 62 feet in length by 5 feet in width. This mound, previous to our visit, had been dug into in two places to a considerable extent, the sides of the excavations indicating that it was composed of the surface clay of the hill with an occasional fragment of rock of the kind which lies plentifully on the hillside.

About 75 yards SW. from Mound B was a mound (C) having a square base and a square summit-plateau. Its height was 5 feet; the diameter of the base, 45 feet, and that of the summit-plateau, 17 feet.

Just back of Mound A, a few feet apart, in line, are two small mounds, that nearest Mound A having a height of 3 feet and a basal diameter of 34 feet. The other mound is 30 feet in diameter of base and 1 foot 8 inches in height.

In that side of Mound A which was highest on the slope, a trench 18.5 feet long by 8 feet in width was dug, beginning somewhat in from the margin and including the central part of the mound. From the outer end of this trench a narrow one was dug to the apparent margin along the yellow, underlying soil.

The mound was composed of the surface soil of the hill, sometimes almost without masses of rock, sometimes with a mingling of angular, silicious masses such as one sees on the surface of the hill, few larger than the head of a man, most much smaller. In places also masses of rock were piled together almost without admixture of clay, and these masses, by pouring out from the side of the excavation into the space at the inner end of the trench, which had been greatly enlarged by us, seriously impeded our work. In fact it became evident that unless the mound was investigated with the aid of a larger force of men than was at our disposal, or that far more time was allotted to it than was at our command, exact data could not be obtained, much of the stone deposit requiring removal by hand.

The investigation strongly indicated that the actual height of the mound was considerably in excess of that determined by us from the part highest on the slope, for besides the likelihood of getting a minimum altitude from such a base, digging showed later that made-ground to a depth of about 3 feet was present on that side of the mound, probably a kind of extension the presence of which would decrease the height of the mound at that part to correspond with the depth of the extension.

Seemingly the mound had been built largely of masses of rock, having clay and clay with a mingling of rock exteriorly and sometimes in layers in the body of the mound. What we believed to have been the original surface of the hill was reached at a depth of 11.5 feet.

Burials had been made in this mound, possibly throughout it. In our central digging they were found lying among the masses of rock about 10 feet 7 inches from the summit of the mound, about one foot above the base. This burial contained bones of at least three individuals, two adults and an adolescent. The parts of the skeletons were not in order and were spread over considerable space. Possibly the burial included more individuals than we have stated, as before the bones were entirely removed an inpouring of masses of rock in a rather threatening way prevented further investigation at that point.

In the extension at one side of the mound, to which we have referred, just under the slope of the mound, the trench put down by us, passing through clay without masses of rock, reached a burial having mingled bones, including two skulls of adults, at a depth of 3 feet 9 inches. With these bones were two conch

The surface material differed from some we have seen on sites along Tennessee river in that no pottery was present; nor was a single shell to be seen. Moreover, no pottery fragments were found in the digging. Abundance of fresh-water shells were mingled with the soil, none, however, being within 18 inches of the surface, though this upper soil was as dark as that below it and evidently had not been brought there to increase the height of the site, but had grown under occupancy, like the rest. Evidently, then, during the latter part of the occupancy of the site, shell-fish were not in use as an article of diet.

An excavation carried from the highest part of the elevation to which reference has been made, went through nearly 6.5 feet of midden soil before reaching underlying, undisturbed ground. The first 18 inches, as stated, contained no admixture of shells. Then came about 4 feet having in the upper part numerous shells, the number growing fewer until in the last foot they were encountered at rare intervals. The final foot of the excavation, however, had many shells scattered through it.

Apparently those inhabiting this dwelling-place had buried where they lived, though no regular cemetery was encountered by us. Four skeletons were found as a result of considerable digging, at depths ranging between 10 and 39 inches, lying closely flexed, one on the right side and three on the left. The heads respectively, were directed N., N. by W., NW., N.

These burials, which were unenclosed, had no associated articles, with the single exception that with the deepest one had been placed a musselshell containing a small amount of red oxide of iron in powder.

Mounds and Dwelling-site near Dixie Landing,[1] Humphreys County, Tennessee.

On property of Mr. J. H. Pearl, who resides there, within sight from Dixie Landing, on high ground somewhat back from the river, is a mound, once quadrangular with a level summit-plateau. The mound, 8.5 feet in height, measured from the east, where it adjoins a great level field, seems of much greater altitude on its other sides, which in appearance are heightened by sloping ground on which they rest. The basal diameters of the mound, whose sides face the cardinal points and whose longer ones are parallel to the river, are 188 feet N. and S. and 125 feet E. and W. The summit-plateau is 112 feet and 50 feet in the same directions, respectively. The mound has been under cultivation.

As is well known, large, flat-topped mounds in southern United States very rarely contain objects of interest, having served, as a rule, for purposes other than those of burial; yet as interments sometimes were made in superficial parts of such mounds, it is well for the investigator to sink trial-holes into them superficially at least. In the mound under description trial-holes soon reached raw clay having no trace of interments.

[1] There is another place of this name a few miles above this one, also in Humphreys County.

At about a depth of one foot, however, was a fireplace near which, in a symmetrical heap resembling a cone with rounded apex, were nineteen masses of soft, fossiliferous limestone, more or less rounded and ranging in size between a clenched hand to double that bulk. These masses, presumably intended as supports for vessels while cooking was in progress, had most likely been carefully piled near the fireplace for convenience, and for some reason had not been removed when the fireplace was abandoned.

To the east of the mound, on the level field, was considerable midden debris, including bits of flint and of pottery. At one place where fragments of human bone lay on the surface, trial-holes were put down which almost at once reached human remains, as follows: a skeleton disturbed by cultivation; an extended skeleton, the head directed S. by W.; a layer of bones, including three crania; an extended skeleton heading S.; the bones of an adolescent, lying partly flexed on the left side, the head directed SSW.; a skeleton at full length, the cranium pointing N. by W. The skull and the upper part of the thorax of this skeleton lay beneath the margin of a fireplace and were calcined. The use of fire in connection with this burial perhaps was accidental. Parallel with this skeleton were two others, from each of which the skull and the upper part of the thorax were missing. On the pelvis of one of these skeletons lay a skull.

Near the three burials last described was another, that of an adult, lying under the fireplace to which reference has been made. This burial, which had been wholly beneath the fireplace, was in anatomical order up to the lower part of the thorax, the upper part of which, along with the skull, was missing and apparently had been disturbed through digging, aboriginal or otherwise, as the fireplace at this point was broken through and parts of it, along with ashes, were mingled with the soil.

Two feet six inches deep was another fireplace at some distance from the one described, which had been burnt so hard that when found with the aid of a steel rod it was taken for a rock or a slab forming part of a stone grave. About one foot above part of this fireplace were a number of scattered human bones showing no trace of fire, while at about the same level and over another part of it was the upper half of a skeleton on which no sign of fire was apparent.

In this field was the remnant of a small, low mound which yielded no return to trial-holes.

Farther north, in sight from the large mound, paralleling the river which it commands to the N., S. and W., is an elevation in the form of a ridge. The northern end slopes somewhat abruptly; the descent on the southern extremity, steep at first, reaches a small rise or hump from which the slope is gradual. The measurements of this elevation are as follows: height of ridge, which runs N. by E. and S. by W., taken from the northern end, 12 feet 9 inches; length of base, 170 feet; length of top, northern slope, 32 feet; crest, 88 feet; southern slope to the hump, having a drop of 6 feet, 22 feet; the hump and from it to level ground, 28 feet. Width of base, 58 feet, as follows: eastern slope, 24 feet; crest, 5 feet; western slope, 29 feet.

An excavation 12 feet by 20 feet was sunk by us about midway of the length of the mound, the longer axis of the hole corresponding to that of the mound, which proved to be composed of a loamy clay. The base was reached at a depth of 9 feet 10 inches, our outside measurement having been taken where there had been considerable wash on the field and in consequence the height of the mound there was greater than its original height. On the opposite, or western side, the apparent height was even greater, as one there would be looking up a slope.

Burials were found as follows:

Burial No. 1, at a depth of 6.5 feet, disconnected bones having belonged to one individual, a heel-bone below the skull, the lower jaw away from the calvarium, the long-bones out of place. These bones, in common with all from this mound, were much decayed.

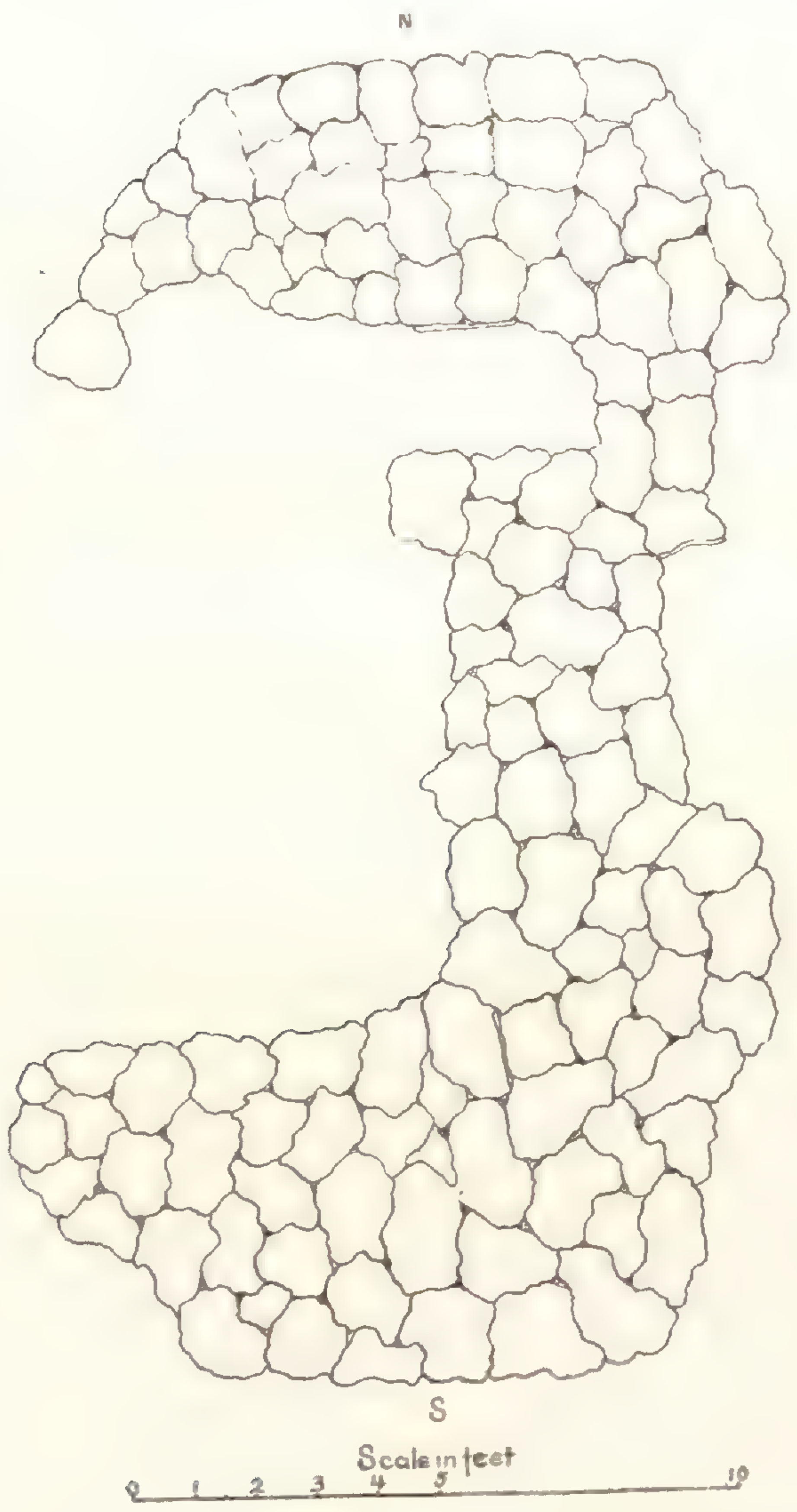


Fig. 11.—Plan showing placement of slabs. Dixie Landing, Tenn.

Burial No. 2, 7.5 feet down, disarranged bones including two skulls, not piled as in a bunched burial but spread. A layer of clay of a much purer grade than the material of which the mound was made, lay under Burial No. 1, and in part over Burial No. 2, which also had clay under it. Layers of this kind were found elsewhere in the mound apart from bones, which probably had decayed away.

Burial No. 3, 8 feet 6 inches deep, disarranged bones belonging to one skeleton.

Burial No. 4, at about the same depth as Burial No. 3, consisted of mingled bones having belonged to one individual.

Burial No. 5, on the base of the mound, resting on charcoal or decayed bark and wood, was a scattered deposit of mingled bones covering considerable space, having belonged to at least seventeen individuals, that number of skulls being represented. This burial did not lie in a grave, apparently, or if in one, its depth must have been inconsiderable, as undisturbed local layers lay above the burial to a considerable distance in the mound.

Burial No. 6, on the base, part of a child's tibia.

Burial No. 7, seven inches above the base, scattered bones belonging to one skeleton.

The entire base of the excavation was carefully spaded through in the hope of coming upon a grave-pit or a ceremonial deposit, but without success.

A few feet from the side of the northeastern end of the mound was a slight rise above the level at that place, about 24 feet in diameter, showing up red in the

plowed field and proving to be made up of particles and masses of clay, reddened by heat, some of the masses bearing imprints of wattle.

Investigation showed this reddened clay to have a maximum thickness of about 2 feet. Beneath it was an arrangement of thin slabs of limestone, of claystone, of fine-grained sandstone, some calcined, others flaked by the effect of heat, lying in one thickness as a rule, but occasionally in double and in triple layers. These slabs were not arranged with a view to an exact level, a few even having been placed on edge. The arrangement, of very irregular outline, as shown in Fig. 11, was about 22 feet long and 12 feet in maximum width, approximately.

The slabs rested on a smooth, hard surface of baked clay resembling a floor, on which was no charcoal or deposit of ashes.

All these slabs, of course, were removed by hand with great care, but nothing was found between them and the hardened clay beneath (under which digging came upon undisturbed soil), except at one place near the northern end of the arrangement of slabs where were found a few fragments of calcined bones, some undoubtedly human, the remainder too small to identify but presumably also parts of a general cremation. Near this place, but above the slabs, also were found a few fragments of calcined bones.

Presumably the aborigines, in connection with this cremation, had proceeded in the following way: Human remains were placed on the ground, which seemingly had been either purposely smoothed in advance or, which is more likely, was the trampled, earthen floor of a wigwam, and the arrangement of slabs laid upon them.

Next a wigwam standing over the remains or near them, was burnt down and the clay from its wattle and daub walls, while still at high temperature, was piled over the slabs and the bones beneath, the intense heat calcining and flaking some of the slabs and consuming most of the human remains.

The clay from the walls of the building must have been intentionally piled over the remains, and not simply have been allowed to lie where it fell, inasmuch as the wattle and daub walls of wigwams were not more than 3 or 4 feet in height, and from them a roof of material unmixed with clay sloped upward. Hence some labor was required to bring the heated clay from where it fell at the outer part of the fire and to arrange it so as to make the highest part of the deposit in the center of the rise as it was found by us.

In connection with this striking ceremony the description of the Bennett mound in this report will prove of especial interest.

In the field, near the great ridge, was a low elevation from which a stone grave had been plowed shortly before our coming, the slabs and fragments of human bone lying on the surface at the time of our visit. Digging at this point came upon no other stone grave or burial of any kind.

All burials found at this place were without artifact of any kind, yet it was in the same county (Humphreys), where this site is, on Duck river, probably not

more than ten miles away, that the superb deposit of flint implements now in possession of the Missouri Historical Society, to which we have already alluded in the introductory remarks, was found.

Dwelling-site at Prevatt's Landing Benton County, Tennessee.

At Prevatt's Landing, the property of Mr. H. E. Whitfield, living nearby, is a ridge in a cultivated field bordering the river bank, composed of rich, dark, loamy sand and having on the surface fragments of pottery, cord-marked when bearing any decoration, and some flint, including a few arrowheads. Other arrowheads of flint were encountered in the digging, as were several piercing implements of bone, wasters of flint, a sphere of silicious material pecked into shape, slightly oblate on one side, having a diameter of 3 inches. Here and there in the soil, as well as on the surface, were fragments of fresh-water shells.

Eighteen burials, fourteen of adults, four of infants or of older children, were unearthed, none deeper than about 3 feet, some in the dark sand of which the dwelling-site was composed, others on the underlying, yellow, undisturbed sand, and a few let down into it a short distance.

The adult skeletons, the crania of which were found without uniformity of direction, had been buried as follows:

Partly flexed on the right	4
Partly flexed on the left	1
Closely flexed on the right	1
Closely flexed on the left	3
Disturbance	1

Burial No. 1 lay on the right side, the right leg closely flexed while the left leg was only partly so.

Burial No. 4, a skeleton rather closely flexed on the right side in a semi-reclining position against the sloping wall of the grave-pit, the skull being 22 inches from the surface, while the pelvis and lower extremities were at a depth of 40 inches. The right humerus lay along the body, having the forearm flexed to the right shoulder. The left humerus was also parallel to the body, but the forearm was across the trunk. The legs were closely flexed on the thighs.

Burials Nos. 13 and 16, skeletons each having the trunk on the back, the thighs flexed vertically, the legs back against them. Along the outer side of the right humerus of Burial No. 16 were the bones of an infant, the head being in the opposite direction from that of the adult skeleton.

Four skulls, some in poor condition, were saved from this place.

Although the site at Prevatt's Landing is but two miles from the mouth of Duck river, along whose banks such interesting discoveries of artifacts have been reported, not a single object can positively be said to have been found by us with any burial in the Prevatt's Landing site. About 15 inches from a skeleton, and at a somewhat higher level, were two rude, chipped implements of flint—small hoes or hatchets—each about 6 inches in length, placed upright, together.

About one foot above and beyond the feet of Burial No. 13, together, were fourteen flakes of flint, the largest 3 by 2.5 inches, the smallest 1.25 inch by .75 inch. Both this deposit and the one last mentioned may well have been in the midden debris, having no connection with the burials.

Mound near West Shipp's Landing, Benton County, Tennessee.

About one-half mile above West Shipp's Landing, within a few feet from the river bank, on property belonging to Mr. H. D. Odle, of Camden, Tenn., is a mound quadrangular with rounded corners, having a flat summit-plateau. The basal diameters are 107 feet and 74 feet. The height as measured by us was 6.5 feet, but as the surrounding field is of loamy sand (as is most of the mound) and has been subject to much wash, it was impossible to determine what the original level of the ground had been. Neither sounding-rod nor trial-holes led to the discovery of any interment in this mound.

Dwelling-site at Leadbetter Landing, Benton Co., Tennessee.

At Leadbetter Landing, on property of the Ayer and Lord Tie Co., Chicago, Ill., of which Mr. J. B. Lord is president, is a dwelling-site of inconsiderable size, on the bank of the river, the higher part of which is covered by a large storehouse. At the time of the building of this structure skeletal remains were disinterred, the discovery creating considerable local excitement.

Extensive digging was done in the earthen floor of the building, in ground just adjoining it on the outside, and in a continuation of the site in a cultivated field nearby, though there, apparently, burials were widely apart.

In all, eleven skeletons were encountered, seven of adults, four of infants or of older children.

Of the adults, one was extended on the back; two were closely flexed on the right; one, closely flexed on the left; one, partly flexed to the right; one, partly flexed on the left. One had been disturbed in aboriginal times. There had been no attempt at orientation of burials at this place. Five crania were preserved, though some were considerably crushed.

With the skeleton of a child were 151 beads of shell, some discoidal, some almost globular, the largest having a diameter of .65 inch. A skeleton at full length on the back had at the neck beads made from the ocean shell *Marginella*.

Alongside this skeleton, beginning at the pelvis and continuing down, the head directed in the same way as that of the burial near which it was, lay the skeleton of a child at whose neck were beads, some of shell, small and of the ordinary kind, others made from *Marginella*.

Mounds opposite the Mouth of Cedar Creek, Decatur County, Tennessee.

Landing opposite the mouth of Cedar Creek (which is on the other side of the river and in another county) and proceeding about one-half mile westwardly to the first high ground, one reaches, on property of Mr. T. S. Hassell, of Clifton,

Tenn., three mounds, all near together. Two of the mounds are each about 6 feet in height and 40 feet across the base. The third mound is about 2 feet high and 25 feet in diameter. These mounds, which were visited by us, had unfortunately been dug to such an extent before our visit that further investigation of them was considered useless.

Dwelling-site near Mouth of Beech Creek, Wayne County, Tennessee.

In sight from the union of Beech Creek with the Tennessee, on the northern side of the creek, on property of Mr. J. L. Richardson, who resides there, is a former aboriginal dwelling-site, the surface of which is thickly strewn with midden debris, from which we selected two pestles, several rude hoes of limestone, many cutting implements of chipped flint, most of them rudely made, some arrowheads and knives of flint.

Fragments of human bones lay on many parts of the field, and we were told that bones and artifacts had been plowed up there for more than thirty years—and probably for a still longer period, as the place had been under cultivation for a long time before our informant's experience of it began.

Slabs of stone lying here and there indicated the former presence of stone graves, but as the soil at this place was too tenacious to permit the use of rods to advantage, we were compelled to rely on trial-holes to discover burials of any kind. The following burials were encountered.

Burial No. 1 consisted of bones thrown irregularly together and may have been a disturbance, aboriginal or otherwise. It lay on yellow, undisturbed clay in the rich, dark, loamy clay of the field. With the bones were a few small, discoidal, shell beads in bad condition.

Burial No. 2, just below the surface, was a stone grave from which the plow had taken practically all of the upper part of one end and some of one side. Within the grave, which apparently had been found and rifled in the past, were slabs, and fragments of human bones. At one corner, beneath a slab that still remained in place, were parts of a tibia and a fibula, and foot-bones all in place. The burial evidently had been that of an adult, the head W. by S. Apparently there had been no flooring of slabs for this grave.

Burial No. 3, lying on undisturbed yellow clay, 18 inches down, was a skeleton closely flexed on the left side, the head directed SE. by S.

Burial No. 4, a skeleton partly flexed on the right, the head N., lying in a grave[1] which extended 14 inches into the undisturbed yellow subsoil. The dark loam of the field was 8 inches deep at this place, making the total depth of the burial 22 inches. This skeleton in part rested on the pelvis of Burial No. 5.

Burial No. 5, a skeleton extended on the back, the head directed SSW. The left arm was flexed, with the hand resting on the left shoulder. This burial, which was 2 feet deep, had a flint point, probably a lancehead, resting on the left thigh.

[1] When stone graves are under description the fact will be distinctly specified.

Burial No. 6, a skeleton extended on the back, lying on the yellow clay which was but 6 inches deep at this place. The skull, if present, would have been directed S. by W., but a post or a tree, as indicated by a round hole which extended considerably deeper than the grave, had destroyed the head.

Burial No. 7, the skeleton of a child, just under the surface, had in line beside it seven earthenware vessels, as follows: over part of the skull and covering an upright bowl and a pot was an inverted bowl. In contact with this bowl, on the body of the child, was an inverted bowl having two small bowls, also inverted, side by side against it. In this bowl was a musselshell, somewhat broken, which no doubt had been used as a spoon. Over the pelvis of the skeleton had been placed an inverted bowl.

All this earthenware was shell-tempered and without line or painted decoration. Two of the vessels (all seven dropped to fragments on removal) had knobs below the rims, while one had a small extension, probably meant to represent the beak in a rude shell-form. Between two of the vessels, upright, was a small, slender celt of indurated shale.

Burial No. 8. This skeleton had been closely flexed on the right, the head pointing NE., but had been badly disarranged by Burials Nos. 4 and 5.

Burial No. 9. Just beneath the surface, and somewhat disturbed by the plow, was a tiny stone grave let down into the undisturbed yellow clay. The top of the grave had been plowed away. This grave, not oblong, but with decidedly rounded corners, was constructed with the aid of eight slabs, some triangular, and placed with pointed ends downward. The floor consisted of three slabs, one comparatively small, used to fill an intervening space. The outside measurement of the grave was 21 inches by 14 inches; the inside measurement, 17.5 inches by 10.5 inches. Within the grave were a few decaying bones of an infant, with which were a considerable number of small, barrel-shaped beads of shell.

Burials Nos. 10 and 11 were skeletons of children, one considerably disturbed by the interment of the other. Near one skull were ten barrel-shaped shell beads, each almost one inch in length.

All the burials described here were near together, though it is of course impossible to determine if the stone-grave burials were made at the same period as were those that were unenclosed.

Mound near Old Furnace Landing, Decatur County, Tennessee.

At Old Furnace Landing is a property belonging to Mr. W. A. Hassell, of Clifton, Tenn. A barn and other buildings are upon a low mound within sight from the landing. This mound, which is now about 2 feet high and 95 feet in diameter, approximately, has been trodden and trampled to such an extent by mules and horses that it is hard to say what its original dimensions were. We were unable to find any part of this mound where digging would not have been a decided injury to it.

shell, and at the feet were several badly-decayed, piercing implements of bone, close together.

Burial No. 8, a stone box-grave 2.5 feet from its top to the surface, oblong, 3 feet 9 inches by 2 feet 1 inch, a single slab at each side and at each end, the covering being a double thickness of slabs in places, smaller ones having been arranged

Fig. 12.—Burial No. 8. Stone box-grave, 3 feet 9 inches by 2 feet 1 inch. Swallow Bluff Island, Tenn.

over gaps between parts of the larger, under ones. In this grave the covering slabs presumably had been held up in part by supports, perhaps of wood, and had not been placed squarely across the grave. Consequently, when these supports had decayed, some of the covering slabs had fallen to a slanting position, as shown in the photographic reproduction (Fig. 12).

This grave, 3 feet 3 inches long by 1 foot 8 inches wide, inside measurement, contained a skeleton, partly flexed, the trunk on the back, the knees drawn up

into the corner of the grave, the left arm and forearm extended along the body, as was the right upper-arm whose related forearm crossed the trunk. The head was directed NNW. The grave containing this skeleton is shown in Fig. 13, the covering and one side of it having been removed.

FIG. 13.—Burial No. 8, showing skeleton, part of the grave having been removed. Swallow Bluff Island, Tenn.

Burial No. 9, a stone grave whose sides formed a rude pentagon supporting a covering consisting of one large slab on which here and there had been placed smaller slabs, in some cases in one thickness or again in two thicknesses, the whole arrangement having an elliptical outline (Fig. 14). This stone grave, 2 feet 1 inch in length and 1 foot 4 inches in maximum width, had a height of 1 foot 2 inches, excluding its lower parts which entered the ground. (It is impossible in

the case of stone graves exactly to determine the height, outside measurement, since the depth to which the various slabs penetrate the ground is irregular and not determinable until the grave is demolished. In the case of inside measurement, of course, one has the floor from which to determine the height.) Seven inches below the top was the skeleton of an infant, whose bones, though not well

FIG. 14.—Burial No. 9. Stone box-grave of an infant, 2 feet 1 inch by 1 foot 4 inches, over all. Swallow Bluff Island, Tenn.

preserved, were in better condition than one would expect them to be, and this applied to all skeletons of infants and of children found at this place. Presumably lime from the slabs above them had acted as a preservative.

Burial No. 10. The supporting slabs of this stone grave had not been firmly set, and having assumed an outward slant, had permitted the covering slabs to fall into the grave, which under these conditions, was 5 feet 7 inches long by 2 feet 7 inches wide, its top being just below the surface. This grave, which was in contact with Burial No. 12, at right angles to it, contained a skeleton closely flexed on the right, having a fragment of a thick cooking pot of earthenware,

about the size of a man's hand, as a mortuary tribute. Presumably, the aborigines, who made a deposit of this kind in another instance at this place, considered the gift as at all events better than nothing, an opinion, however, with which the investigator of stone graves is not likely to agree.

Fig. 15.—Burial No. 12. A stone box-grave, 3 feet 8 inches by 2 feet 5 inches, over all. Swallow Bluff Island, Tenn.

Burial No. 11. This grave, 1 foot 2 inches from the surface, was not a box-grave, like the rest, but a mere arrangement of slabs in one thickness, 3 feet 4 inches long by 2 feet 2 inches wide, placed over the bones of a child, which lay 4 inches below.

Burial No. 12, a few inches from the surface, was a fine example of the stone

box-grave, the sides and ends upright, the covering slabs resting squarely on them. This grave, oblong, 3 feet 8 inches by 2 feet 5 inches, had the sides and ends of single slabs, except at one point where there were two slabs. Surrounding the grave small gaps had been filled with slabs of inconsiderable size; other unimportant spaces had been left uncovered. The top was composed of three large slabs forming a single layer, the one at the lower end of the grave, however, having another slab upon it, forming a double layer at this place (Fig. 15).

FIG. 16.—Burial No. 12, showing the skeleton, part of the grave having been removed. Swallow Bluff Island, Tenn.

The inside measurements of this grave were 3 feet 3 inches by 1 foot 8 inches. Its depth was 1 foot 1 inch. The considerable difference in width between the inside and the outside measurements (the latter taken over all), is accounted for by the projecting ends of the covering slabs.

In the grave, partly flexed to the right, as shown in Fig. 16, representing the grave after removal of certain slabs, was a skeleton, the head directed E. by N.

Burial No. 13, a stone grave, the sides and ends forming an oblong and having a covering oval in outline made up chiefly of one great slab, diamond shaped, its four corners resting on the central parts of the sides and the ends of the grave

(which had been evenly dressed to afford a level support), leaving four corners of the top of the grave uncovered. These corners, however, had been carefully overlaid in double and treble thickness with small slabs whose rounded outlines, projecting over the corners in places, formed the oval outline of the entire cover-

FIG. 17.—Burial No. 13. Stone box-grave, 3.5 feet by 2.5 feet, over all. Swallow Bluff Island, Tenn.

ing, as shown in Fig. 17. The entire grave, which was 2 feet from the surface, measured 3.5 feet by 2.5 feet over all.

On the bottom of the grave, whose inside measurements were 2 feet 8 inches by 1 foot 5 inches and 1 foot 4 inches deep, was a skeleton of a young woman, the trunk on the back, the knees closely flexed toward the left and resting against the side of the grave, the bottom of which the trunk completely filled, as shown in the

illustration (Fig. 18). The head, which would have been directed S., owing to lack of space had been pushed over on the chest.

Burial No. 14, a carefully-made cist, its top 3.5 feet below the surface, 4 feet by 3 feet 1 inch in size. The sides consisted of single slabs, double slabs being at the head of the grave while the foot was made up of one slab of fair size, a small

FIG. 18.—Burial No. 13, showing skeleton, some of the slabs having been removed from the grave. Swallow Bluff Island, Tenn.

one filling a space at a corner. The covering, which was level, was made up of three large slabs, resting on which were four smaller ones covering open places.

The grave, 3.5 feet by 2.5 feet and 1 foot 2 inches deep, inside measurement, contained a skeleton partly flexed on the right, the head directed S. The skull of this burial was saved.

Burial No. 15, unenclosed, 3 feet 9 inches deep, closely flexed to the right, the head SSE.

Burial No. 16, unenclosed, 13 inches below the surface, partly flexed to the right, the head SSE. At the left of the skull was a pot having two loop handles, and at the right another with loop handles and an encircling row of knobs around the body. At the right shoulder was the shell of a tortoise or of a turtle, with which no pebbles were found. At the outer side of the right humerus was a vessel having two loop handles and a rude, incised decoration. All these vessels were small, more fitted for interment with a child than with an adult, and were of the most inferior quality of ware.

Burial No. 17, two feet four inches down, the bones of a young child, unenclosed.

Burial No. 18, a stone grave slightly more than 3 feet in length and 16 inches in width, about .5 foot below the surface, the sides and ends composed of upright slabs in single thickness, a space 10 inches in width unfilled at one side. The top, perfectly flat, was made up of two slabs and a fragment to cover the space where they failed to meet. There was a small opening, however, uncovered at one corner.

This grave, interiorly 34 inches by 13 inches and 9 inches deep, was irregularly oblong, being somewhat wider at the foot than at the opposite end, owing to the greater size of a covering slab. It contained an infant's skeleton, the head S. by E.

Burial No. 19, a few feet from Burial No. 18 and at the same depth, but at a right angle to it, was a grave 28 inches by 20 inches. This grave was not a complete enclosure, spaces being at one of the sides, though the top was almost entirely covered. At the bottom of the grave, whose inside measurements were 2 feet by 17 inches by 1 foot in depth, were the bones of an infant, the head directed E.

Burial No. 20, a grave having the sides pentagonal, the top roughly oval, made up of two slabs having upon them three small ones covering spaces. This grave, 23 inches by 17 inches, is shown in Fig. 19.

The inside measurements of this little stone grave were: length, 18 inches; width, 13 inches; depth, 9 inches. Within it lay the skeleton of an infant which, notwithstanding its diminutive size, had the legs flexed, a necessity imposed by the restricted quarters. One end of the grave, not as wide as the opposite end, was formed of two slabs meeting at an angle and contained the lower part of the skeleton.

A curious feature connected with this mound, which was plainly a domiciliary one, having burials in its summit-plateau (which, as we know, is sometimes the case with this class of mounds), was that no burials were encountered in the central part of the plateau, all being marginal, and especially numerous at the four corners. Did we not know the aborigines sometimes buried under their dwellings, we might feel assured the center of the plateau had been the site of a wigwam and that burials had been made round it, and such, in this particular instance, may have been the case.

The smaller mound on Swallow Bluff Island, measured from the northern side on the general level of the field, is 9 feet 6 inches in height. It is about square, with a diameter of 90 feet; the summit-plateau is about 30 feet across. The sides and corners of the mound exhibit no orientation evidencing a purpose.

Fig. 19.—Burial No. 20. Stone box-grave of an infant, 23 inches by 17 inches, over all. Swallow Bluff Island, Tenn.

As the soil of the summit-plateau did not lend itself to the use of the sounding-rod, recourse was had to trial-holes, which were put down throughout almost all the available space on the plateau. At a depth of somewhat more than 4 feet through dark clay with some admixture of loam, hard yellow material was reached which was not indicative of the presence of graves.

The following burials were encountered in the dark layer above the yellow.

Burial No. 1. Sixteen inches from the surface was a symmetrical, elliptical fireplace 14 inches by 16 inches and about 5 inches deep, having the sides, which were not sloping, but vertical, burnt red, and the base hardened by fire but containing no ashes or charcoal.

Near this fireplace, but perhaps having no connection with it, was a stone grave consisting of limestone slabs arranged in a single thickness on another fireplace, the hardened clay of which served as a floor for the grave, but as the

grave cut through still another fireplace, it is possible that the position of this one may have been accidental and that all these fireplaces belonged to the dark midden layer and not to the graves.

The slabs of this grave were not let into the soil below the level of the floor, but seemed to have been simply placed on edge on the floor of the excavation and apparently had bulged out after the completion of the grave. At all events four slabs covering the grave, a large one and three small ones, had fallen in between the slabs constituting the sides. The upper margin of the side slabs, moreover, was very irregular and could have afforded but little support to the covering slabs.

The grave, outside measurement, was 4 feet in length and about 2 feet wide at the central part. Its depth, estimated from the top of the side slabs, was 1 foot 5 inches. It was not oblong, but converging and rounded at the end where the skull rested.

On the fireplace which served as a floor, was the skeleton of an adult, the head directed E. The trunk lay on the back, the head pushed forward on the chest. The thighs were partly drawn up to the right, with the legs flexed against them. The right arm lay along the body, as did the left humerus, but the left forearm lay across the trunk. There was no room to spare within the grave, the skeleton being in contact with the slabs at the head and foot, and at the foot of the grave some effort had been necessary to accommodate the bones, the width of the grave not having been sufficient, originally, to receive the thighs and pelvis if placed horizontally on the floor. In consequence, the thighs were angled against one side of the grave.

In the grave with the skeleton no artifacts were found, but on the upper side of one of the top slabs that had fallen in was an undecorated bowl which fell into bits on removal. Seemingly this bowl had been placed on the grave after the arrangement of the slabs and before the earth was filled in.

Burial No. 2, traces of a skeleton of an adult, about 3 feet down, extended on the back, the head directed S.

Burial No. 3, remains of the skeleton of a grown person, which had been flexed to the left, the head S.

Burial No. 4, crowns of the teeth of a child. This burial, as well as the preceding one, was 20 inches deep.

Burial No. 5, a stone grave. From the surface of the mound to the top of the grave the distance was 2.5 feet. Above the grave were scattered human bones indicating that another burial had been disturbed in the making of the stone grave.

The supporting slabs of this grave, in single thickness, had been arranged in a manner similar to those described in connection with Burial No. 1 in this mound, and consequently they slanted outward to a considerable extent, with the exception of the slab at the foot of the grave only, which remained vertical. Hence, the covering slabs had fallen in, some resting squarely on the bones which they

had crushed, others with one edge down and the opposite side still remaining on the supporting slabs. The top slabs had been irregularly placed, overlapping, some in double thickness, some three deep.

This grave, somewhat larger than it had been originally, no doubt, owing to the outward slant of the supporting slabs, was 6 feet 10 inches in length and 3 feet 4 inches in width. On the bottom of the grave, which was without slabs, was a skeleton extended at full length on the back, the head directed ENE. The grave, inside measurement, was 5 feet 9 inches in length and slightly more than 2 feet in width; its depth, one foot. The astragalus and the scaphoid of the right foot lay half-way to the knee, though the other foot-bones and the bones of the left foot were in place.

Artifacts with this burial were not of a gratifying kind. At the right of the skull, concave side up, was a sherd, 10 inches by 7 inches, which had formed part of a large cooking vessel. At the outer side of the left knee had been an upright vessel with encircling knobs below the rim, now decaying and broken.

Burial No. 6. This burial, that of a young child, lay about 2 feet down protected by a single slab of stone which lay over it diagonally. Presumably the body had been placed in the bottom of the excavation and the slab had been arranged above it, the upper part leaning against the side of the grave. Two small fragments of stone near the skeleton may have had some connection with the burial, perhaps may have fallen from the protecting slab.

Mound at Old Callens' Landing, Hardin County, Tennessee.

At Old Callens' Landing (the present landing being somewhat farther up the river), immediately on the river's bank and apparently having suffered to some extent from wash on the side nearest the water, is a mound having a flat top with numerous trees upon it. This mound, 8 feet 6 inches in height, is on the property of Messrs. Callens Brothers, of Cerro Gordo, Tenn. The diameter of the base parallel to the river is 106 feet. The present width of the base is 56 feet. The sides do not face the cardinal points.

The mound, of clay with some admixture of loam in the upper parts, was not sufficiently soft for the use of the rod. The summit-plateau was tested with trial-holes in all directions, but without success.

Mound near Dickey's Landing, Hardin County, Tennessee.

On the estate of Mr. J. S. Dickey, whose home is upon it, is a mound having a flat top which, as well as the sides, evidently has been plowed over for a long time, as the mound has no regular outline. It is situated in a cultivated field about one-half mile NE. from Dickey's Landing. Its height is 11 feet; its diameters of base, 145 feet and 95 feet. Neither it nor the surrounding area has any history of discoveries of artifacts or bones, though, of course, before the time of the present generation, aboriginal graves may have been discovered there.

This mound, which was of sandy loam in the upper two-thirds, lent itself to the use of sounding-rods, and in consequence was prodded in all parts by us. In addition, numerous trial-holes were put down, but nothing of interest was encountered.

Mounds on the Williams Place, Hardin County, Tennessee.

The Williams Place, two miles below Savannah, Tenn., on the same side of the river, is described in the Smithsonian Report for 1870 (p. 416 *et seq.*) as having a number of mounds which were investigated by the agent of the Smithsonian Institution. Results are detailed that show the lack of success which is likely to follow mound exploration along Tennessee river.

We did not attempt further investigation at this place, having learned that some of the mounds there had been plowed away since the investigation referred to and that no discoveries had been made during the cultivation of the property.

Mounds at Savannah, Hardin County, Tennessee.

This aboriginal site, originally of importance, was surveyed and investigated for the Smithsonian Institution, the results being detailed in the Smithsonian Report for 1870 (p. 408 *et seq.*), and in the Twelfth Annual Report of the Bureau of American Ethnology (p. 578). Since the visit of Mr. J. Parish Stelle, who conducted the investigation, the mounds of the group have been destroyed wholly or in part owing to their presence within the limits of the town. No further investigation was considered by us to be feasible or desirable.

Mounds opposite Wolf Island, Hardin County, Tennessee.

On the right-hand side of the river, going up, opposite the lower end of Wolf Island, on property controlled by Mr. J. F. Williams, of Crump, Tenn., are two mounds about 150 feet apart, near the river bank and in full view from it.

The larger mound, which has a flat top and probably has been quadrangular, is said to have had a house upon it. Its shape at present is somewhat irregular. Several small holes, no doubt unambitious efforts of treasure-seekers, were in the summit-plateau. The height is 12 feet; the diameters, 115 feet and 165 feet. We were unable, by systematic prodding and by trial-holes, to get any trace of burials in the superficial part of this mound.

The smaller mound, very symmetrical, about circular as to the base, which had a diameter of 50 feet, almost without summit-plateau, was on the end of a ridge about 2 feet above the general level, which gave the mound the appearance, from one side, of having a height of about 7 feet; but this in reality, was not the case, the base of the mound being on the upper surface of the ridge, as was shown by a central hole 8 feet by 10 feet sunk by us to the undisturbed soil and into it.

The mound had been made of clay on top to a depth of about 1.5 foot when sand having a slight admixture of clay continued 3.5 feet to the bottom of the mound.

Traces of four burials were come upon, three resting on the sand and covered by the upper layer of clay, and one (Burial No. 4) completely in the sand, 40 inches from the surface.

Burial No. 1 consisted of traces of bone and two crowns of teeth. Burial No. 2 was remains of the skeleton of an adult, which had been flexed to the right, the head SSW. Burial No. 3 showed only indications of bone; no teeth or trace of the skull were recovered.

Burial No. 4, fragments of the skeleton of an adult, which had been partly flexed to the left, the head SE. At the left shoulder was a small, undecorated pot of very inferior ware, which had possessed two loop handles, one of which was missing. At the right of the skull was a small bowl on edge, somewhat broken, undecorated save for a rude effigy of the head of a bird rising from the rim on one side, and a conventional tail extending horizontally on the other side.

Mounds near Perkins Bluff, Hardin County, Tennessee.

Immediately back of the landing at Perkins Bluff is high ground, property of Mr. G. L. Perkins, of Crump, Tenn., the fields on which have in places small deposits of midden debris. In light woods bordering the fields are a number of small mounds from a few inches to 4 feet in height and from 15 to 35 feet in diameter.

The largest of these mounds, evidently very symmetrical originally, had been dug out thoroughly as to its central portion prior to our visit, and human bones lay at the border of the hole. We were told that a shell on which were "letters" (a gorget, if anything) had been found with the skull of a skeleton lying on the bottom of the mound. Four equidistant trenches, each about 3 feet wide, were put in by us from the margin of the mound along its base to where the previous digging had been, through raw clay in three instances, the fourth trench in clay and gravel. Our efforts were without success.

Nine other mounds, including one in a cultivated field, some of which had been previously dug into, were carefully investigated by us. In one, but a few inches in height and about 15 feet across, was a skeleton 7 inches down, partly flexed on the right, the head NW. The skeleton lay on raw, undisturbed clay in dark, loamy soil containing some midden refuse.

In another mound in which some digging had been done, part of a human left femur lay at the edge of the hole.

A number of other mounds at this place, similar outwardly to those described by us, and probably inwardly also, were left uninvestigated.

Mound near Pittsburg Ferry, Hardin County, Tennessee.

About 300 yards NNE. from the landing at Pittsburg Ferry, which is opposite Pittsburg Landing, in a cultivated field belonging to F. C. Williams, D.D.S., of Savannah, Tenn., is a mound that evidently has been under cultivation for a considerable time, and whose dimensions may have differed greatly from those

noted at the time of our visit, which were: height, 4.5 feet; diameter of circular base, 80 feet.

The mound, of material mainly clay dark in color, was riddled with exploratory holes by us except in the outer parts where preliminary digging indicated no burials were to be found.

In addition, a hole 10 feet by 9 feet was sunk centrally in the summit to a depth of 6 feet, with four smaller excavations from its base, each about 18 inches in depth. Five feet 6 inches down a base line seemed to be reached, but this was not decisive, clay of much the same color as the mound continuing as far as the digging went, and a fragment of worked flint coming from the greatest depth. Presumably the mound had been built on the made-ground of the dwelling-site.

Immediately below the surface scattered fragments of human bones were found, evidently indicating disturbances by the plow. With one of these disturbed burials had been three vessels of earthenware, undecorated and commonplace in form, whose fragments were mixed with the bones.

Five burials in all were encountered, none deeper than 2 feet, two of which had cut through fireplaces in the mound.

Burial No. 1, a skeleton extended on the back, the head E. Lying transversely on the thorax was a graceful celt of slate, 5.3 inches in length. At the right shoulder was a small, undecorated bottle having a globular body with an angular base. Near the skull was a small bowl with a rude animal head on one side and a conventional tail on the opposite side.

Burials Nos. 2 and 3 were each partly flexed to the right, the head to the E. Over the feet of one was a mixture of bones of another skeleton, including the skull.

Burial No. 4 lay extended on the back, the head directed E. by N. At the skull was a small, undecorated pot having two loop handles, and a large fragment of a coarse cooking vessel lay on the trunk. An asymmetrical bottle of yellow ware, undecorated, having a neck in the form of a truncated cone, was at the right shoulder.

Burial No. 5, a mixture of bones 15 inches down, seemed rather too deep to have been a disturbance through cultivation, and may have been an aboriginal one. All the bones in this mound were badly decayed and fell to pieces on removal.

In a nearby dwelling-site holes came upon a skeleton extended on the back, the skull, plowed away in all likelihood, being absent. Its direction would have been E. by N.—easterly like those in the mound. Part of the skull of a child also was found just below the surface.

Mounds near Pittsburg Landing, Hardin County, Tennessee.

At Pittsburg Landing, immediately overlooking the river, is the United States National Cemetery where lie many of those killed on the Union side in

the engagement at Pittsburg Landing and at the Battle of Shiloh, which took place on the high ground around the landing, in the Civil War between the States.

The Federal government also has created and maintains the Shiloh National Military Park, where the Battle of Shiloh was fought, and in this park, near the

Fig. 20.—Plan of mounds on Shiloh Battlefield, Tenn.

river, is a group of seven beautiful, symmetrical, aboriginal mounds, a plan of which, made by Dr. M. G. Miller at the time of our visit, is shown in Fig. 20, and various low humps and knolls of aboriginal origin, one of which, comparatively low and of very irregular outline, is sometimes described as an eighth mound belonging to the group.

Immediately on the bank of the river is a superb mound (*A*) with steep sides, on which a house has been built for the use of the superintendent of the park.

This mound, as are five of the others, is square or nearly square, with a flat summit-plateau, the sides approximately facing the cardinal points. The heights of the mounds are as follows:

Mound *A*—14 feet 6 inches.	Mound *E*— 5 feet 1 inch.
Mound *B*— 8 feet 6 inches.	Mound *F*— 9 feet 3 inches.
Mound *C*—10 feet 2 inches.	Mound *G*—11 feet 6 inches.
Mound *D*— 9 feet 10 inches.	

Permission to dig into these mounds is at present unobtainable, though most of them have been investigated, apparently to a very limited extent, with one exception (Mound *C*) to be referred to in due course. The humps, however, have been dug considerably, owing, perhaps, to their convenient size. Under the summit-plateau of Mound *G* were buried the dead of the Twenty-eighth Illinois Infantry, prior to their removal to the National Cemetery nearby. The traces of the burial trenches in this mound might be mistaken for vestiges of former investigation were not the facts a matter of history.

Mound *C*, elliptical in outline, was dug into in 1899 and a most remarkable pipe was discovered in it. An excellent account of the work, by Col. Cornelius Cadle, who conducted it, is given in Records of the Past (July, 1902, p. 218 *et seq.*), the height of the mound as stated by him, namely, 10 feet 2 inches, exactly tallying with our measurement.[1]

Colonel Cadle, in the selection of this particular mound for investigation, evinced excellent judgment or enjoyed great good fortune, since all other mounds of the group, being square of base and flat of top, presumably were domiciliary and most likely contained no burials. We quote from the account:

"Continuing the work we reached the center, driving about 2 feet further. This cut, commencing at the surface, was driven at a slight angle upward for drainage in case of rain, and because I expected to make a 'find' on the original surface and at the center. For a space of about 4 by 5 feet in the center, 8 inches above the original surface (the surface of the cut), the ground, upon striking it with the handle of a shovel, sounded hollow. Going back toward the entrance, 1 foot from the resounding area, a hole was dug 2 feet deep and across the cut, and with knife and fingers the earth slowly taken away, toward the supposed 'hollow.' We were rewarded in an hour or two by finding, first, that this 'hollow' area had been covered with large logs. Carefully removing this wood, which was decayed, we found the remains of three bodies, the crania, the vertebræ, the arm and leg bones; apparently laid upon the surface of the ground before the mound was started, either in a sitting position; or possibly the bones had been brought there for reinterment, and the burial place had been timbered so as to form a cell or room, but the wood in decaying had caused a cave-in, filling up the room.

[1] The account, however, is in error in two particulars, namely, in stating that the mounds are oval as to the bases with one exception (that marked A on our plan), and in assigning to this mound a height of 25 feet, which altitude, as we have said in the introduction to this report, would require a part of the river bank on which the mound is, to complete.

Fig. 21.—Effigy-pipe found by Colonel Cadle, in a mound on Shiloh Battlefield. (Full size.)
(Greatly enlarged from a photograph in Records of the Past.)

. . . About the center of this burial space we struck something that looked like an arm in stone. For two hours we carefully excavated and dug, not daring to use any implement but our knives and fingers, and were rewarded by finding a pipe in human form, bent on one knee, the bowl and place for the mouth-piece in the back. It is about 10 inches high, carved apparently from either 'Catlinite,' the 'red-pipe stone of Minnesota,' or a similar stone. It is the most perfect piece of prehistoric carving that I have seen, much superior in artistic work to anything of the kind described and illustrated in Force, Short, Bancroft, Thruston and others, or that I have seen in various collections."

This remarkable pipe, which, enlarged from an illustration taken from Records of the Past, is shown in Fig. 21, to which Colonel Cadle does no more than simple justice, is now in the office of the superintendent of Shiloh National Military Park at Pittsburg Landing, where it is exposed to fire, theft, and breakage. Its place is in the National Museum at Washington.

Mound near Nash Landing, Hardin County, Tennessee.

About half a mile above Nash Landing, in an open field, on property of Mr. O. C. Hagy, of Selmer, Tenn., is a mound reported by our agent, who estimated its height at 10 feet, to have been very badly dug away; hence the mound was not visited by us.

Mounds below North Carolina Landing, Hardin County, Tennessee.

In a cultivated field about one mile in a westerly direction from North Carolina Landing, on property belonging to Mr. John T. Morris, living somewhat farther back from the river, are two mounds about 60 yards apart.

The larger mound has long been under cultivation and the furrows of the field in which it is are carried continuously over it in plowing, so that on two sides its slope has become very gradual. On a third side it has been in part cut away by a road. Its present height is about 7 feet; its diameters, about 100 feet and 150 feet, approximately. The mound, which no doubt has been quadrangular, with flat top,—a domiciliary mound,—is of raw, yellow clay and yielded no sign of burial.

The smaller mound, about 3 feet in height and 50 feet across its irregular base, has been plowed around—and probably over, though not under cultivation at the time of our visit—and has been mutilated by a roadway. This mound was carefully dug into in a number of places, though its composition, raw, yellow clay from the beginning, gave little hope of success. A base-line was reached at a depth of 3 feet 7 inches, but some of the holes were carried somewhat farther. With the exception of a broken piercing implement of bone, no sign of man's handiwork or of human remains was encountered.

From the surface at this place was picked up an arrowhead of gray flint, 1.9 inch in length, .8 inch in width, and having a maximum thickness of only .15 inch.

Mound near North Carolina Landing, Hardin County, Tennessee.

On property of Mr. H. B. McGee, living somewhat back from the river, is a mound in a cultivated field, about one-half mile SW. from North Carolina Landing. The mound is without corners, the sides slope gently, and the top is convex. It is impossible to say what shape the elevation may have had, as it has been incorporated in the field, all the cultivation of which is shared by the mound. Its length is 90 feet; its width, 55 feet. Its height, as taken by us, was somewhat more than 5 feet, but it became evident in the course of the digging that the debris of the dwelling-site, which the surrounding field had been, had accumulated around the mound, thus impairing its original height.

Fig. 22.—Bottle of earthenware. North Carolina Landing, Tenn. (Height 8.7 inches.)

Centrally a hole 8 feet by 10 feet was sunk and the height of the mound from the original surface was determined as 7 feet. Remains of two post-holes were found in the digging, and of several fireplaces at different depths, one having had the outline of a basin.

Though parts of a human skull and several teeth were on the surface of the mound at the time of our visit, no bones or artifacts were encountered in the

central excavation, though one of two smaller holes, which were made on each side of the main excavation, came upon two bottles near together, about 1.5 foot below the surface, having, however, no human remains in association. One of the bottles (Fig. 22), with a slender neck expanding toward the mouth, had been covered with red pigment, much of which had disappeared. The ware is fairly good, and, in conjunction with the grace of its form, seemed to promise earthenware of more artistic design and manufacture than we had so far found on Tennessee river. The other bottle, with a broad neck, is undecorated and of inferior ware.

Mr. McGee, the owner of the property, informed us that recently a stone grave had been plowed up near the mound, and our digging in the surrounding field came upon a slab of limestone a few inches below the surface, near which was part of a human humerus. Presumably a stone grave had formerly been at this place.

About one-half mile westerly from the mound is a field about eleven acres in extent, so thickly covered with fragments of flint-wasters, flakes, chippings, and parts of pointed and edged implements—that one could not walk without covering a number of them at each step. But little in the way of fragments of pottery could be seen, and complete points or other implements were rare. Mr. McGee informed us that in the past many arrow- and spear-points had lain on the surface, but these had been broken by the plow or carried away. We heard from another source that persons living nearby had searched the field for implements and that an employe on a fleet of dredgeboats which had been quartered on the river nearby had acted as a collector for a dealer in antiquities.

A number of trial-holes were put down in a small rise in the field, one of which came upon a slab of limestone 8 inches from the surface, beneath which were the bones of the upper extremities and the upper part of the thorax of a human skeleton—no doubt the remainder of a stone grave.

There were also found remains of a skeleton, unenclosed, so badly decayed that the form of burial could not be determined, and two skeletons in very poor condition, both extended on the back, one heading SE., the other ESE.

Apart from bones were found a sheet of mica about 6 inches by 5 inches, and a slab of limestone, no doubt having belonged to a stone grave.

There can be little doubt that stone graves were at this place in the past, but whether of the box-grave variety or not, we are unable to say.

Dwelling-site near Pickwick Landing, Hardin County, Tennessee.

On property of Mr. T. J. Fields is what is generally supposed to be a mound, about one mile SE. of Pickwick Landing, on the right-hand side of the river, going up. Careful examination based upon digging showed this elevation, which is about 11 feet high and 82 feet by 110 feet in basal diameters to be a natural formation.

In the neighborhood of this elevation has been an extensive, aboriginal

dwelling-site, many contiguous fields having scattered over them fragments of stone, flint in the main, and some knives, lancepoints, and arrowheads, of flint, broken and whole. Three points selected from others gathered at this place are shown in Fig. 23, one of which, having been broken on one side, has been worked over to give the broken margin an edge. No rise was apparent in any of the fields, and the level ground seemed no longer to be midden debris, which presumably has washed away, leaving on the present surface what had been on it and in it.

Fig. 23.—Points of flint. Site near Pickwick Landing (near Sulphur Creek), Tenn. (Full size.)

Mound near Boyd's Landing, Hardin County, Tennessee.

In sight from the river bank when foliage does not intervene, about one-quarter mile in a northerly direction from Boyd's Landing, in woods forming part of the property of Mr. J. H. Lakey, living about one mile farther back from the river, is a mound 7 feet in height. The mound has been washed away to some extent, or dug into considerably, years ago. At all events, part of its northern side is missing, so that what probably was once a circular base with a diameter of 70 feet, has that dimension now only through its E. and W. parts. There was almost no summit-plateau, and the mound, judging from its shape, might well have been erected for burial purposes.

From the summit of the mound a hole 11 by 6.5 feet was carried to a depth of 7 feet 9 inches, reaching a dark band marking the original surface, 7 feet 7 inches down. From the base of this excavation five holes were dug, one in the center

and one in each corner, the corner ones extending 18 inches down through clay evidently without former disturbance, with one exception where 5 inches below the line of the base two masses of galena (lead sulphide), one somewhat larger than a clenched hand, one smaller, were found together. Both these masses were heavily coated with lead carbonate, the white-lead of commerce, used for the making of paint. In the great site at Moundville, Ala., we found this white-lead pigment on ceremonial palettes of stone in aboriginal graves. In the mound under description, these masses lay on undisturbed clay, but were surrounded by the dark material composing the base-line, and evidently were a deposit of some kind.

The central hole put down from the base, 4 feet long by 20 inches wide, was carried through material that seemed to have been disturbed, perhaps by the planting of a post. Nothing was discovered in this hole.

In the main excavation in the mound, which went through raw clay without indication of occupancy or of burial, were no fireplaces. The only artifacts found were occasional chips of flint and fragmentary projectile points, perhaps introduced with the clay in the making of the mound. Five masses of galena, two together, also were come upon in the digging. The discovery of quantities of galena will be described in our account of Tennessee river mounds in Alabama. The reader is invited to consult the "Handbook of American Indians" as to galena.

Mound near Swan Pond Landing, Hardin County, Tennessee.

Our agent visited a mound a short distance above Swan Pond Landing, on property of which Mr. Thomas McKelvy is the owner. This mound, according to our agent, has a flat top, is about 7 feet in height and 70 feet square. There is a building on this mound and permission to dig was not obtained.

Mounds near the Mouth of Yellow Creek, Hardin County, Tennessee.

About one-half mile due west from the mouth of Yellow creek is a mound in woods belonging to Messrs. Walker and Ross, of Savannah, Tenn. This mound, apparently intact at the time of our visit, was 32 feet across its circular base. Its height varied, the mound being on a slope. From the upper side the altitude was but 1 foot 4 inches, while measured from the lower side it was slightly more than 5 feet.

An excavation 12 feet square was put down in the central part of the mound, showing it to be of raw, yellow clay and that there was no marked line of the base, compact clay of lighter shade than that of the mound being encountered, however, at a depth of 30 inches. This was dug out to an additional depth of one foot without showing modification and undoubtedly was the underlying clay of the mound.

Five inches from the surface was a skeleton much decayed, indicating a burial closely flexed to the left. Ten inches deeper were fragments of two long-bones.

Twenty-eight inches down lay mere traces of bones, and at about the same level, but some distance away, were the remains of two femora and two tibiæ, not in order but lying side by side and having the remains of a skull at one end.

Twenty-two inches from the surface were two slabs and a mass of sandstone not in contact, the slabs being about 4 inches apart and the mass 5 inches from them. Altogether they covered a space 14 inches by 34 inches. On these fragments of rock were traces of bones, presumably all that remained of a burial which had lain on this placement of stone.

Apart from burials were found a mass of galena, and a graceful arrowhead or lancepoint of flint, slightly more than 3 inches in length, having a conspicuously long stem and similar to one figured by Thruston[1] as coming from Tennessee. It is also a Missouri form.[2]

One-quarter mile WSW. from the mound just described is another, also in woods and of the same ownership, into which previous diggers had run a trench a yard in width, from the margin to the central part, broadening somewhat there. The height of the mound was 4.5 feet; the diameter of its circular base, 38 feet.

An excavation 16 feet square was put down through the light-yellow clay of the mound to what seemed to be the base, about 5 feet from the summit, where compact clay, darker in shade and soon merging into red, was encountered. On this hillside it was evident no dwelling place had been, so no midden debris was present between the undisturbed clay and the body of the mound.

Near the surface was a slab of limestone under which were a human pelvis and the upper parts of two femora, evidently the remainder of a burial which had been cut away by the previous digging, at the edge of which these remains were found. Slightly more than one foot down and at a depth of 4 feet, respectively, were traces of bones.

About 3 feet down was a fireplace on which clay used in making the mound had been thrown. This clay had been somewhat discolored by the heat.

About 9.5 feet from the center of the mound, 2 feet 4 inches down, under the slope, were two slabs, one of sandstone, the other of limestone, and a mass of cherty material, arranged rudely in the form of a horizontal triangle with an altitude of 2 feet 7 inches and 2 feet across the base, which was composed of a slab and a mass side by side, the remaining slab forming the apex of the triangle. Three other slabs were in the soil somewhat above the grave, separated, without arrangement, apparently not directly connected with it.

Under this triangle of stone was a burial of an adolescent rather closely flexed on the right, the bones, even the ribs, retaining their shape but crumbling somewhat on removal. With the exception of the pelvis, which protruded, and of small parts left unprotected where the slabs and the mass were not in contact, the skeleton was completely covered by the stones.

[1] *Op. cit.*, Plate XI.

[2] Gerard Fowke, "Prehistoric Objects Classified and Described," Plate X, Bulletin 1, Missouri Historical Society, Department of Archæology.

Five feet to its bottom, in part under the stone grave just described, was a grave-pit 2 feet 3 inches wide by 6 feet 5 inches in length, extending 2 feet into the undisturbed clay below the base of the mound. This grave, in which no trace of bone remained, had been filled with the yellow clay of the mound. It is interesting to note in this mound the absence of a central grave or of one comparatively near the center of the base.

PART II.

Tennessee River in Mississippi and in Alabama.

Here, continuing our investigation on Tennessee river, we leave the state of Tennessee for a time and for a few miles have Mississippi on our right and Alabama on our left, as we ascend the stream. Then our exploration is continued in the state of Alabama.

Mounds and Sites.

Mound near Hubbard Landing, Tishomingo County, Mississippi.
Dwelling-site at Baugh's Landing, Lauderdale County, Alabama.
Mounds near Riverton, Colbert County, Ala.
Dwelling-sites near Colbert Creek, Colbert County, Ala.
Mounds on the Johnson Place, Lauderdale County, Ala.
Dwelling-sites on Koger's Island, Lauderdale County, Ala.
Mounds near Perkins Spring, Lauderdale County, Ala.
Dwelling-site near Cane Creek, Colbert County, Ala.
Mound and Dwelling-sites on Seven Mile Island, Lauderdale County, Ala.
Mound near Florence, Lauderdale County, Ala.
Dwelling-site on Gilchrist Island, Colbert County, Ala.
Dwelling-site at Lock No. 3, Lauderdale County, Ala.
Periwinkle Hill, Lauderdale County, Ala.
Dwelling-site on the Weaver Place, Lauderdale County, Ala.
Mound on Tick Island, Lawrence County, Ala.
Mounds above Nance's Reef, Lauderdale Co., Ala.
Mound near Sycamore Landing, Lawrence County, Ala.
Dwelling-site on Gilchrist Island, Lawrence County, Ala.
Dwelling-site above Milton Bluff, Lawrence County, Ala.
Mound on Brown's Island, Lawrence County, Ala.
Dwelling-site at Brown's Ferry, Limestone County, Ala.
Dwelling-site on Mason Island, Limestone County, Ala.
Mound on the Steel Place, Limestone County, Ala.
Mound at Decatur, Ala.
Mound and Dwelling-site near South Flint River, Morgan County, Ala.
Mound near Limestone Creek, Limestone County, Ala.
Dwelling-site on the Hopper Place, Madison County, Ala.

Dwelling-site near Cataco Creek, Morgan County, Ala.
Mounds on the Slaughter Place, Morgan County, Ala.
Dwelling-site at White's Ferry, Madison County, Ala.
Mound and Dwelling-site above Chunn's Landing, Morgan County, Ala.
Mounds and Dwelling-site on Hobbs Island, Madison County, Ala.
Dwelling-site at the mouth of Flint River, Madison County, Ala.
Dwelling-site near Bean Rock, Marshall County, Ala.
Dwelling-site near Paint Rock Landing, Marshall County, Ala.
Dwelling-site on the Foster Place, Marshall County, Ala.
Dwelling-site on the Penney Place, Marshall County, Ala.
Mound near Guntersville, Ala.
Dwelling-site on McKee Island, Marshall County, Ala.
Dwelling-site on the Seibold Place, Marshall County, Ala.
Mounds on Henry Island, Marshall County, Ala.
The Roden Mounds, Marshall County, Ala.
Mound and Dwelling-site on Pine Island, Marshall County, Ala.
Dwelling-sites near Garland's Ferry, Jackson County, Ala.
Mounds on the Snodgrass Place, Jackson County, Ala.
Cox Mound and Dwelling-site, Jackson County, Ala.
Mounds on the Rudder Place, Jackson County, Ala.
Mounds near Widow's Creek, Jackson County, Ala.
Mounds near Williams Landing, Jackson County, Ala.
Mounds and Dwelling-site on Bridgeport, or Long, Island, Jackson County, Ala., and Marion County, Tenn.

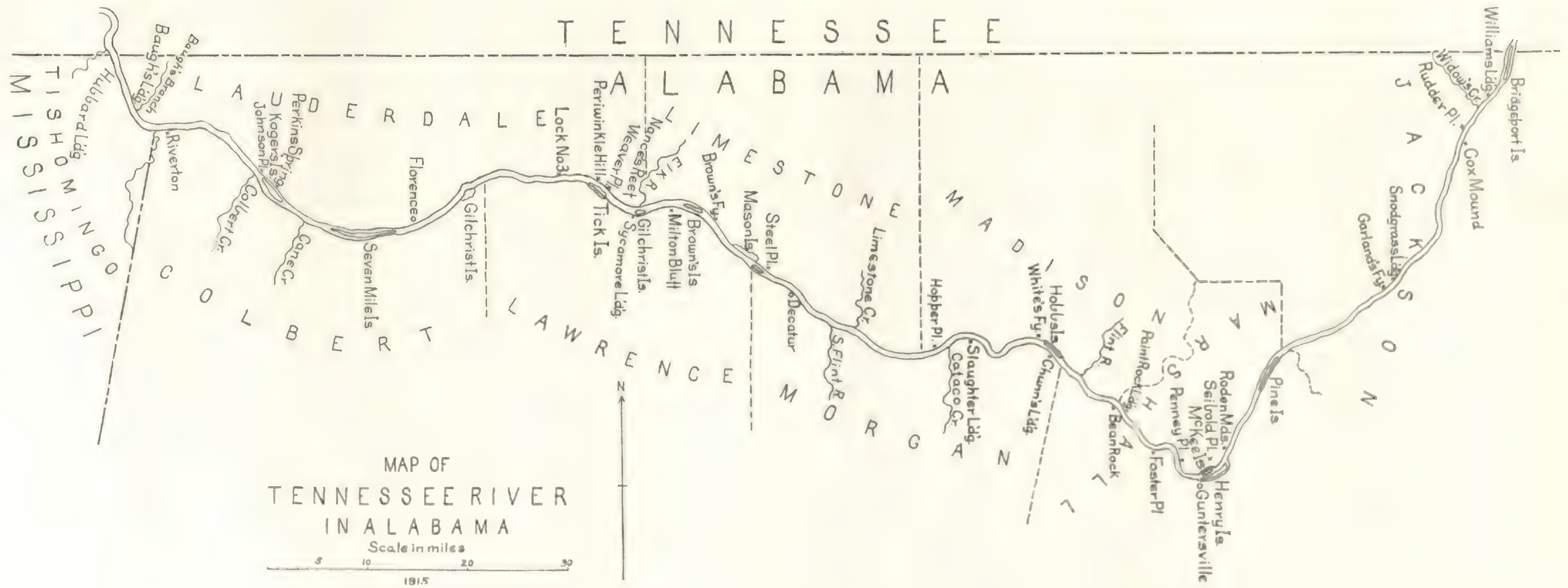
Mound near Hubbard Landing, Tishomingo County, Mississippi.

About one mile in a WSW. direction from Hubbard Landing, near the residence of Mr. R. L. Hubbard, to whom it belongs, is a mound about 4 feet in height and 30 feet in diameter. We visited this mound but found its central part completely dug away.

Dwelling-site at Baugh's Landing, Lauderdale County, Alabama.

At Baugh's Landing is a large, cultivated field belonging to Mr. J. J. Baugh, who lives about one mile inland. The southeastern corner of this field is formed by the junction of Baugh's branch with Tennessee river. In this part of the field is a slight rise above the general level, having an irregular boundary, but approximately 175 feet in diameter. This elevation was covered thickly with the usual debris found on aboriginal sites. In addition were picked up a globular shell bead about .6 inch in diameter, and several discs made from fragments of pottery vessels. Bits of human bones lay here and there.

Trial-holes came almost at once upon burials and indicated that interments had been made mainly in the central part of the elevation, which was slightly



MAP OF
TENNESSEE RIVER
IN ALABAMA
Scale in miles

higher than the rest of it. Such burials as were found by us belonged to the later period of the growth of the midden deposit, as none were found at a depth greater than 3 feet 8 inches, and most were considerably nearer the surface.

From the surface of the central part of the elevation to undisturbed ground beneath was 9 feet, through midden soil mixed with shells, the shells being comparatively numerous but not forming any large proportion of the material. Away from the central part of the elevation, however, shells in places were almost without admixture of soil, as if such spots had served as general dumping places.

Varying in depth between one and two feet the superficial soil of the site was very dark. Below this it was much lighter in shade, and on this account, and by reason of the admixture of dark material from above, such pits as were found in the lighter soil were readily distinguishable. There were, however, in this lighter material below the dark soil, three graves which had not been sunk through the dark layer, but lay in the light material unmixed with dark soil from above, and evidently had been buried before the accretion of the superficial part of the elevation.

A thorough examination of this site was not made, only two really deep trial-holes having been put down. By the time the central part of the site, a space about 40 feet in diameter, had been dug through to a depth not exceeding 5 feet, the owner, by bringing forward a claim that everything found should be considered his property, caused us to terminate the investigation.

In much of the central portion of the elevation (no burials were found in the trial-holes sunk in the outer parts, though doubtless some were there and would have been found by us had the investigation continued) burials had been numerous, grave often intersecting grave and depriving the earlier burial of some of its parts. When but a comparatively small proportion of the skeleton was missing, enough remaining fully to indicate the form of burial, the interment was included in our list, but scattered bones, of which a considerable number was found, were not particularly noted.

The condition of the bones at this place probably owing to the presence of so much shell, which seems to reinforce skeletal remains by the addition of salts of lime, was fairly good; two skulls were preserved.

In all, twenty-five burials were encountered. Of these, fourteen were of adults, two of adolescents, nine of infants or of older children.

Of the sixteen adults and adolescents, six were extended on the back, one was closely flexed to the right, three were partly flexed to the right, one was closely flexed to the left, and one partly flexed to the left. Two were bunched burials of single skeletons and two will be particularly described.

Of the twelve burials which lay with the skulls directed horizontally in various directions, one pointed E., one E. by S., two ESE., three SE., two SE. by S., one SSW., one W. by N., one WNW.

Burial No. 12 had the pelvis and the feet on the same level, the trunk up-

right, the knees erect but somewhat parted, the forearms drawn up against the upper arms, which were in contact with the sides of the body. The head was forced forward and down, the top of the cranium resting on the ground immediately in front of the pelvis. The burial, of course, had been wrapped in this position, which made for great economy of space.

Burial No. 19 much resembled the preceding as to arrangement, with the difference, however, that the forearms were crossed on the pelvis and the skull rested on them.

About 3 feet from the surface and immediately on a fireplace, though the bones showed no mark of heat, was the skeleton of a dog, in complete order, the identification having been made by Dr. F. A. Lucas, who writes, "It is an example of the characteristic, short-faced 'bull terrier' breed of dogs that seems to have been popular in our south and southwest."

The remains of the Indian dog as found in the shell-heaps of Maine (and incidentally in some shell-heaps of New York and in certain aboriginal cemeteries of Arkansas) have been interestingly described by Loomis and Young.[1] The jaw of a dog found by us in a Florida shell-heap is described by the late Prof. E. D. Cope.[2]

Artifacts were present with but five burials, as follows:

Burial No. 3, a child, had at the head a pot with loop-handles.

Burial No. 4 had the skull resting on a fragment of pottery. At the left of the head was a bottle with slender neck and expanding opening, having a trailed decoration on the body made up of partly interlocked scrolls (Fig. 24), a design well known on earthenware beyond the Mississippi. At the outer side of the right elbow were two small celts, one of quartzite, one of igneous rock, and a somewhat larger one of shale, rudely fashioned, at the outer side of the right thigh.

Burial No. 5, a child, had a pot with loop-handles lying inverted at the right side of the skull, and a good-sized pot, also with loop handles inverted over the feet.

Burial No. 9 had at the head part of a coarse, undecorated bowl in which lay a large musselshell (*Symphynota complanata*) and an undecorated bottle with globular body and wide mouth. At the outer side of the left knee was a large pot having loop-handles, upright, containing a vessel of coarse ware but of interesting form. Around the upper part of the body are two encircling rows of knobs, and on the margin of the opening all around have been notches. From the level of the opening, on two opposite sides, have been extensions through which fluid could be poured. Part of one of these, unfortunately, was crushed by the blow of a spade in the hands of one of our diggers. Under each of these extensions has been a loop handle, both of which, apparently, have been

[1] F. B. Loomis and D. B. Young, "On the Shell-heaps of Maine," American Journal of Science, Vol. XXXIV, July, 1912, p. 17 *et seq.*

[2] "The American Naturalist," July, 1893, p. 614.

broken off during the period when the vessel was in use; a hole drilled in the extension remaining intact indicates that the broken one had a similar perforation, the two holes taking the place of the handles. This vessel, after restoration of the broken extension, is shown in Fig. 25.

FIG. 24.—Bottle of earthenware. Baugh's Landing, Ala. (Height 9 inches.)

A number of vessels of this class (which seems to be found principally in northern Alabama), though varying considerably in detail, was found by us, all somewhat broken, though restorations have been made, and will be described and figured by us in the course of our report on that part of Tennessee river which flows through Alabama.

Burial No. 23, adolescent, had at the neck forty-nine small, discoidal beads apparently made from fresh-water musselshells, and a shell pendant fashioned from the columella of a conch (*Busycon*) pointed at one end, blunt at the other end which has a transverse hole for suspension.

The pots from this place, coarse, shell-tempered ware, were nearly all badly

broken when found. The bottle we have figured is symmetrical and exhibits much more ambition on the part of its maker than any we encountered to this point on Tennessee river, except possibly the one found by us in the mound at Pittsburg Ferry, somewhat farther back. The bottle from Baugh's Landing, however, has trailed decoration of a quality better than any seen by us in Tennessee

FIG. 25.—Vessel of earthenware of a kind found principally in northern Alabama. With Burial No. 9. Baugh's Landing, Ala. (Height 4.8 inches.)

Mr. Baugh, the owner, had an earthenware pipe which he said had been plowed up on the site under description. This pipe, which was examined by members of our party, has a flat base projecting somewhat beyond the bowl. The bowl of the pipe had been modeled to resemble an ordinary bowl in use for domestic purposes, having four loop-handles, which, however, had been partly broken off. Around the body of the bowl are knobs similar to those shown by us on the vessel from this place.

Mounds near Riverton, Colbert County, Alabama.

In a cultivated field belonging to Messrs. Buchanan and Sloan, of Riverton, Ala., about 200 yards SE. from the government building at the entrance to Colbert Shoal canal, is a mound which at the time of our visit was 5 feet 6 inches in height and about 100 feet in diameter. This mound, a mixture of sand and

clay, probably had been quadrangular, with a flat top, but had been plowed over so continuously that it no longer possessed a definite outline.

Two large trial-holes reached the base of the mound at respective depths of 6 feet 9 inches and 6 feet, the latter hole being on the slope. These holes and others, sunk on the sides of the mound, encountered no burials or artifacts.

The field surrounding the mound is covered with quantities of pebbles, broken and whole, and many chips and fragments, all of flint. Among these were some broken points but whole ones were rare. No shells and but little pottery were apparent. This dwelling-site presumably had grown up around the mound to some extent, which accounts for the discrepancy in height as taken from the outside and from the inside of the mound.

In the same field, about one-half mile SW. from the other, is a remnant of a mound, about 4 feet in height and 35 feet in diameter. The presence of a large stump on top of this elevation presumably has kept it from being plowed away.

A thorough examination accorded this remnant failed to discover bones, but came upon one arrowhead or knife, of flint, and three masses of galena (lead sulphide) placed together. The largest of these, which had been rubbed down to a discoidal form, was 2 inches in diameter and one inch in thickness. The deposit of lead carbonate on these masses, which, being white lead as we have stated, the aborigines sometimes used as paint, was thicker and whiter than we have noted before on galena found by us, and would, with the addition of bear's grease, make a perfectly white paint.

Dwelling-sites near Colbert Creek, Colbert County, Alabama.

All on property owned or controlled by Mr. William Rutland, of Cherokee, Ala., are three dwelling-sites visible from the river.

One, about one mile below the mouth of Colbert creek, was dug into by us to some extent, but was found to be so solid a mass of crushed shell and soil, and digging progressed so slowly, that it became evident a very long time would be required to investigate the site, so work on it was discontinued.

The next site in order going upstream, on the north side of the creek, at its mouth, was made up of material similar to that found in the other site, and its investigation was abandoned for the same reason. The skeleton of an adolescent partly flexed to the left, the head N., was encountered 13 inches below the surface. At the outer side of the left elbow was a small bowl having loop-handles.

Immediately across the creek is another dwelling-site, much smaller than is either of the other two. At one side of this site is a small elevation, probably intentionally made as a place of burial, as its material, dark alluvial soil, had no admixture of midden debris.

Four large trial-holes sunk into this elevation, which proved to be only a remnant of a mound, came, in one instance, at a depth of 15 inches, on the skeleton of an adult, partly flexed to the left, the head SE. Above the left elbow was half of a bowl, and a bottle with wide mouth having had a most unusual

feature for a bottle, namely, a loop-handle at two opposite sides immediately below the opening, one of which, however, had been broken off and lost prior to the inhumation of the vessel. This bottle, with the missing handle restored, is shown in Fig. 26.

FIG. 26.—Bottle of earthenware. Colbert Creek, Ala. (Height 6.5 inches.)

MOUNDS ON THE JOHNSON PLACE, LAUDERDALE COUNTY, ALABAMA.

About one-quarter mile back from the landing, at the Johnson Place, belonging to Mr. John Beckwith, of Florence, Ala., are two fine-looking mounds near together, one about 10 feet in height, the other 7 feet approximately. Permission refused.

DWELLING-SITES ON KOGER'S ISLAND, LAUDERDALE COUNTY, ALABAMA.

Koger's Island, controlled by Mr. J. T. Reeder, of Smithsonia, Ala., has about midway on its western side a landing at which is the only settlement on the island. Immediately back of this settlement is some cultivated ground,

ending in a slope, and on this slope in years past, all within a comparatively restricted area, have been plowed up, according to the statements of those living in the settlement, a considerable number of vessels of soapstone, some whole, some shattered by the plow. At the time of our visit numerous fragments of these vessels lay over the surface of the ground, and part of a pailful of other fragments were shown us by a person living nearby. The flat base of a soapstone vessel which must have been of interesting shape, is in the possession of Mr. Reeder, at Smithsonia. We were informed that none of the vessels had been found for several years, and our investigation of the place where the vessels had been convinced us that the upper soil which had contained them had been

Fig. 27.—Trowel of earthenware. Koger's Island, Ala. (Full size.)

removed by cultivation and by wash of rain. However, we succeeded in obtaining one, though not by excavation, the lugs at each side being an interesting though not an uncommon feature.

Near the upper end of the island is a large field covered with fragments of flint and of coarse, shell-tempered pottery, some bearing a check-stamp decoration conferred, as we know, with a paddle. Here and there lay fragments of human bones. From the surface we obtained a number of rough implements of moderate size, and some arrowheads of flint, also a heavy object of earthenware, shown after partial restoration in Fig. 27, which, though differing somewhat from those figured by Thruston,[1] probably was a trowel used for smoothing earthenware vessels.

[1] *Op. cit.*, p. 162.

This site was made up of dark midden soil to a depth of about 18 inches, when a mixture of soil and shell, the shell predominating, was encountered. Considerable digging led to the discovery of the skeletons of two young children, both in the upper soil. A knoll at one side of the field was carefully investigated without success.

We obtained from an inhabitant of this place an oblong gorget of igneous rock, having two perforations, 5.75 inches in length and 2.25 inches in maximum width. We were informed by the colored man who had plowed the large field for a long period back, that ten years ago gorgets of this class were frequently found there, and we, at the time of our visit, came across fragments of two of them on the surface.

A woman resident in the settlement showed us a drinking-cup wrought from a conchshell, which she had found and which was interesting in that it had a circular hole in the base, not broken through but evidently cut out with much care, thus clearly demonstrating that the "killing" of a vessel for interment with the dead had taken place as far north as northern Alabama.

A spade of shale, 17 inches in length and about 5 inches wide, was picked up from the surface by a member of our party in another part of the island.

Mounds near Perkins Spring, Lauderdale County, Alabama.

Leaving the main landing, which is on the western side of Koger's Island, and following a road leading across the island, one comes, after about one mile's walk, to a waterway almost dry when the river is low. Crossing this, one is but a short distance from Perkins Spring, on property be onging to Mr. J. T. Reeder, of Smithsonia, Ala., to whom the Academy is indebted for many courtesies.

Mound A.

In a very large, cultivated field covered with fragments of stone, evidently an aboriginal dwelling-site in the past, is a mound about 200 yards NNE. from Perkins Spring. This mound is 7 feet 8 inches in height, outside measurement, and 62 feet by 55 feet in diameters of base. The mound, which had every appearance of having been erected for burial purposes, apparently had never been under cultivation, nor was any previous digging in evidence.

In its central part an excavation 16 feet square was put down, and eight trial-holes to be described later were sunk around it.

The mound was of brown, loamy material in the upper part, below which was black, midden soil containing small fragments of stone and other dwelling-site debris. Below this, over part of the base of the mound, was raw, yellow clay which had been dug from underlying clay in making a large grave that had been filled in part by the return of some of the yellow clay and by black, midden soil of the kind found in part of the mound.

The base of the mound was reached at a depth of 6 feet 6 inches, and was marked by the presence of a black deposit, 9 inches in depth, which formed

Fig. 28.—Agricultural implement of shale, having double cutting edge. Perkins Spring, Ala. (Full size.)

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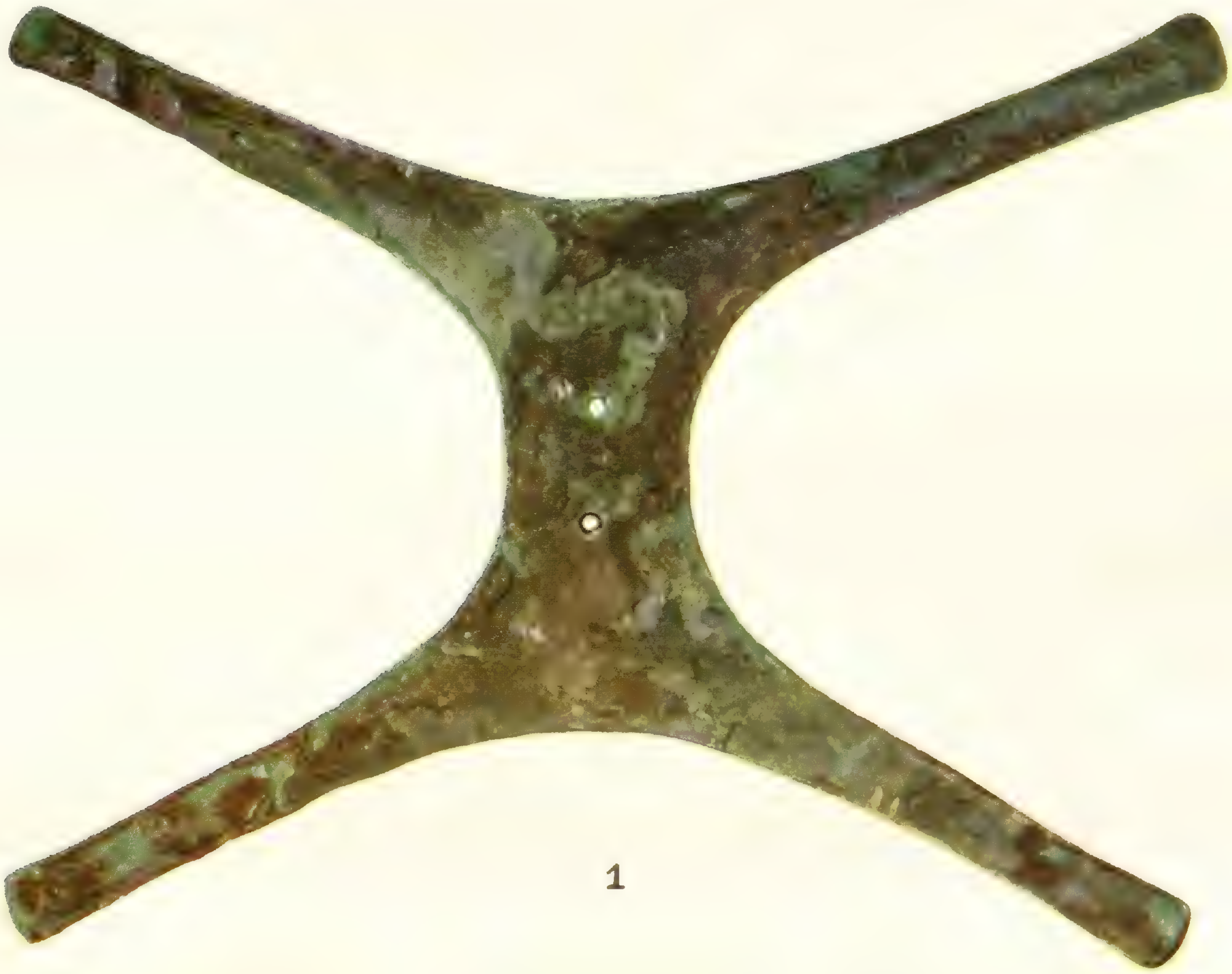

1

·M·L·BAKER·

1. MOUND NEAR PERKINS SPRING, REEL-SHAPED ORNAMENT OF COPPER. (FULL SIZE)
2. MOUND ON THE SLAUGHTER PLACE, REEL-SHAPED ORNAMENT OF COPPER. (FULL SIZE)

the original thickness of the dwelling-site and rested upon the yellow, undisturbed clay. Around the mound all this midden soil had been washed away by rain after cultivation, thus rendering the mound higher than it originally had been.

The following burials were encountered in the main excavation.

Burial No. 1. About one foot down was a skeleton extended on the back, badly decayed, having at the left side of the skull a small bowl of a size usually found with burials of children, having had four rude handles, one of which is missing, and a double row of indentations below the opening. Near the bowl was a small knife of flint.

Burial No. 2, two feet from the surface, was the remainder of a skeleton consisting of traces of the skull and of the thigh-bones, which were at a distance from the skull such as to indicate that the skeleton had been extended and that intervening parts of it had decayed away. Along the space where the trunk had been was a layer of pure clay about 2 inches thick. About 2 feet from the shoulder was a double-bladed, agricultural implement of shale, 11 inches long and 4.3 inches wide (Fig. 28), possibly having belonged to another burial which had entirely gone.

Burial No. 3, remains of a skeleton extended on the back at a depth of 5 feet 3 inches, the skull resting in a drinking-cup wrought from a conchshell (*Busycon*). At the left of the skull was a small deposit of clay about 6 inches in diameter. On the thorax lay a mass of galena (lead sulphide) about ten pounds in weight, under which were a few discoidal shell beads, badly decayed.

Burial No. 4 also was extended on the back, at the same depth as the preceding burial. On the upper part of the thorax rested a mass of galena, 2.5 inches by 2 inches by 1 inch thick, flat and showing considerable grinding, as did nearly all the galena found in this mound. At the feet of the burial was a small mass of pure clay.

Burial No. 5, not far from the center of the base, was a grave, oblong, 7.5 feet in length and 2.5 feet wide, extending through the midden soil below the base and entering the undisturbed, yellow clay to a depth of about 2 inches.

In this grave lay a skeleton, extended on the back, having, at each side of the head, a well-preserved, spool-shaped ear-ornament of copper. On the upper part of the pelvis was a reel-shaped, ceremonial ornament of copper (Plate V, Fig. 1), the longer axis of the body of the ornament with its two perforations lengthwise, corresponding in direction to that of the skeleton. At the foot of the grave was a mass of pure clay.

The reel-shaped, ceremonial ornament of copper, to our knowledge, has been but once previously described. Thruston[1] figures one of these objects and speaks of it as probably used as a pendant or breast ornament. It was found, he says, in a mound in Marshall County, Tenn. (This county is about south from Nashville, midway between the Cumberland and Tennessee rivers.)

[1] *Op. cit.*, Plate XVa, p. 352j.

To Prof. W. K. Moorehead we are indebted for the information that one of these ceremonials from a mound at Newark, Ohio, is in the collection of Phillips Academy, Andover, Mass. In a note accompanying a tracing of this ornament, written some time ago by Mr. R. S. Peabody, we are told, "Objects of this form are very unusual in stone and only one or two of copper are in the museums."

Evidently this class of ceremonial ornament hitherto has been but little known, presumably because its vogue was principally among the aborigines of northern Alabama, where there has been so little archæological research.

We have examined the handsome, reel-shaped ceremonial of copper in the small but interesting collection of the University of Alabama, at University, Ala., near Tuscaloosa, which, owing to its size and the graceful, terminal expansion of the arms, is the most striking example of this class of objects of which we have knowledge (and we obtained nineteen of them in varying degrees of completeness from mounds along Tennessee river in Alabama). We are under obligation to Prof. Eugene A. Smith, State Geologist of Alabama and member of the faculty of the University, for full details as to this ceremonial, which is nearly 6.5 inches by 8.5 inches, over all, and about .1 inch in thickness. It came from near the Coosa river in Coosa county, Ala., some distance south from where most of our objects of this kind were obtained.

We were not able to decide positively on what part of the body these ceremonials were worn, as we found them both on the chest and on the pelvis of skeletons, and having the perforations sometimes in line with the burial and sometimes transverse to the skeleton. Usually, however, when determination was possible (and frequently it was not), the ornament lay on the chest, and the two perforations were across and not in line with the trunk. Several of our specimens, wrought from unusually thick material, are without perforations.

Now to return to the burials.

Burial No. 6, lying about midway on the base of the large grave which we have referred to at the beginning of the account of this mound, was what was left of a skeleton, extended face down.

The grave, one side of which almost passed through the center of the base of the mound, was 9 feet 8 inches in length and 4 feet 4 inches in width. The depth of the grave from the top of the mound was 9 feet 8 inches. It extended through 9 inches of the midden soil already described and entered the undisturbed, yellow clay to a depth of 2 feet 5 inches.

Alongside the burial was a mass of pure gray clay, 8 feet long and 13 inches wide, increasing to 16 inches at the feet. Its thickness was about 5 inches down to the feet, which rested upon it. Beyond them it increased in thickness about 2 inches and contained masses of pure red clay. This clay deposit did not rest against the side of the grave, but lay 10 inches from the head wall and 9 inches from the wall of the adjacent side. Its distance from the foot of the grave about corresponded with that of the head.

At the right shoulder was a mass of galena, about five pounds in weight.

Under the lower dorsal vertebræ was a copper celt, 4 inches long by about 2 inches in maximum width. The preservative properties of the copper carbonate on this celt were the only means we had to determine that the skeleton had been placed in a prone position, as several of the vertebræ indicating this fact had been kept in fairly good condition by the copper salt, the rest of the burial being represented merely by traces.

At the knees was a mass of galena, weighing ten pounds, and at the ankles, resting on the clay, was another mass weighing about six pounds.

Burial No. 7, in the same grave as was Burial No. 6, was the skeleton of a child lying in a direction like that of the adult. If the child's skeleton lay on its back, which its condition did not permit us to determine, then the skeleton had a side of the grave at its left and the adult burial at its right, the mass of clay described lying on the other side of the burial of the adult. Near the skull of the child, probably at the neck, was a spherical bead of solid copper, flattened at the poles, one inch in diameter.

Apart from any burial, in the main excavation in the mound, was a small mass of lead sulphide.

We now take up details of the eight trial-holes before referred to, which, 3 feet by 6 feet each, were put down around the main excavation in the hope of coming upon additional graves. These holes were greatly increased in all directions when the base of the mound was reached, so that most of it may be considered to have been investigated. The result was as follows:

Burial No. 8, a skeleton extended on the back, lay at a depth of 4 feet 9 inches, not far from the base, as the mound sloped considerably above where the burial had been made. This interment was not in a pit, but had been placed in the mound during its construction, as the soil above and around it showed no mingling of material other than that of the mound.

Above this skeleton had been placed an arrangement of slabs, some of limestone, some of claystone, certain ones, especially those at the ends, being thin and of considerable size. The arrangement, 8 feet long by 1 foot 10 inches in width, in the main consisted of two layers, but in one place, at least, there were three thicknesses of slabs. Below the lower extremities of the skeleton, the grave had sunk, the stones above sinking with it, and had become somewhat disarranged. The reason for this became apparent when it was found that another grave lay under the lower part of Burial No. 8 and that in settling it had caused that part and likewise the slabs above, to sink also.

The only thing found with the burial was a mass of pure clay at the feet. It was evident that the makers of this grave had, as generally seems to have been the case with stone graves, fulfilled most of their duties when they had arranged the slabs.

At a depth of 40 inches, in soil darker than the material of which this part of the mound was composed, the deeper shade probably being the result of decay of human remains, was a reel-shaped ornament of sheet-copper, parts of which had disintegrated.

Six feet down, below the slope, was a grave 3 feet 7 inches long by 17 inches wide, made through the midden deposit and extending one foot into the undisturbed, underlying clay. Absolutely nothing was found in this grave, which undoubtedly had been that of a child, possibly an infant.

Immediately on the yellow or underlying clay, 5 feet 10 inches deep at this part of the mound, was a layer of red clay, 30 inches long by 1 foot in width and 2 inches thick, which probably marked a grave that had been put down through the midden soil above. Under the deposit of clay was a small amount of dark material, possibly the remains of a burial, and four small, copper beads.

Eight feet seven inches deep, extending 2 feet into the undisturbed yellow clay, was a grave 9 feet long and 28 inches wide, in which the skeleton that undoubtedly had occupied it had entirely disappeared through decay. On the base of the grave was a mass of lead sulphide larger than a man's fist, and at one end was a mass of clay.

Mound B.

Mound B (from which Mound C was but a few yards distant) is in the same great site as Mound A and also the property of Mr. J. T. Reeder, and is about one-half mile SE. by S. from Mound A. The mound, which has been cultivated over for a long period and largely plowed down had, at the time of our visit, a height of 3.5 feet and diameters of 60 feet and 50 feet, but as the material plowed from the mound had been spread around it, its height, taken from the outside, was considerably less than the distance from the summit to the interior base, while, no doubt, the diameters of the mound were much less before it was plowed over than at present.

A hole 16 feet square was sunk in the central part of this mound. Two and 2.5 feet down, respectively, were eighteen masses of galena and twelve masses of the same material, mostly small.

At a depth of slightly more than 3 feet had been a burial, though no trace of bones remained. This burial, which was not in a grave dug for it, but lay in the body of the mound surrounded by the material of which the mound was composed, had been covered by a layer of pure clay, nearly 5 feet long and from 18 to 22 inches in width. This layer, 2 inches thick as a rule, increased to 7.5 inches in thickness at one end. On the bottom of the grave, surrounded by the clay, was a mass of galena 3 inches by 2.5 inches by 2.5 inches, smoothed in places by rubbing.

Four feet down were traces of a skull which may have been interred alone, though it is possible that the remainder of the skeleton, badly decayed, had been dug away unnoticed by our men, since the remains did not lie in a grave, which would serve as a guide to those digging, but lay in the material composing the mound, without mixture.

Having its southeastern corner but a short distance from what we considered to be the center of the base, was a grave 10 feet 5 inches long and about 5 feet

in width, its base about 7 feet from the top of the mound, and extending 2 feet into undisturbed, underlying clay, its long axis in an E. by N. and W. by S. direction.

On the base of this grave presumably had been a burial or burials which had been covered in the main by a layer of pure clay and one of sand, the sand below the clay. These layers began 19 inches from the eastern end of the grave, and outside them were the remains of a skull on the base of the grave, the only human remains found in it. The layer of clay, which had been symmetrically placed in the grave, with a view to the distance between its sides and its ends and those of the grave, had a length of 6 feet 9 inches and a width of 2 feet 7 inches. Its maximum thickness was 5.5 inches.

The layer of sand immediately below the clay apparently began with the clay at the eastern end and continued to the western end of the clay, having a maximum thickness midway of about one inch.

Near the eastern extremity of the clay layer and surrounded by it was a mass of galena, smooth in places, about the size of a cocoanut, but of irregular outline, which must weigh more than twenty pounds. On the clay, in it and especially under it, where they were numerous, were small masses of galena, sometimes several together.

Mound C.

Mound C, under cultivation at the time of our visit, is said to have been dug into considerably in the past, though but little sign of such digging was encountered Its height was 2.5 feet; its diameter, 45 feet. From the top to the base, however, was almost 4 feet. An excavation 10 feet square was put down, which later was much enlarged.

About 15 inches down parts of a skull were found, near a previous digging.

A grave 9.5 feet long by 1 foot 8 inches in width, extending 1 foot into underlying clay, radiated from the center of the base NE. and SW., the southern end being nearest to it.

Burial No. 1. On the bottom of this grave, the head at the SW. end, was a skeleton extended on the back.

Burial No. 2. Having its feet resting on the pelvis of Burial No. 1 was another extended skeleton, without a skull, lying in a reverse direction.

At each side of the extremities of these two burials was a lower extremity of an adult skeleton, the feet directed NE., the knees of the two skeletons and of the partial burial being all together and having on them a skull (probably that belonging to Burial No. 2) and below them a shell drinking-cup in fragments.

A layer of clay covered the skeletons with the exception of the lower part of one femur, which protruded, and overlay the entire base of the grave with the exception of the terminal 9 inches at the NE. end. This layer was about 4 inches thick, increasing to about 5.5 inches at the NE. extremity.

Burial No. 3. Beginning a short distance from the center of the base, its

southern end nearest to it, was a grave running SSE. and NNW., and about at right angles from the long axis of the other grave.

The grave under description, 9 feet 9 inches long, 2 feet 9 inches wide at the southern, or head, end, broadening somewhat toward the feet, extended 2 feet into otherwise undisturbed clay. On the base of the grave was a skeleton extended on the back, the skull 19 inches from the end of the grave, having the front teeth, the chin, and cervical vertebræ dyed light green and olive green variously by carbonate of copper from thirty-six beads of sheet-copper, some tubular, some barrel-shaped, all comparatively small except one which is about 1.25 inch in length. Over the skull was a shell drinking-cup in fragments, also much decayed, and another shell cup and a mass of clay were about 6 inches distant. On the thorax was a mass of galena about the size of a child's fist, and on the trunk, above the pelvis, another mass somewhat larger. At the foot end of the grave was a mass of clay.

A careful search over the great site, including many fields making up this property, resulted in a considerable collection of lanceheads, arrowheads, and knives of flint. No triangular arrowheads were found, nor was a single fragment of pottery picked up on the surface or discovered in the mounds, though it was present on nearby Koger's Island.

Dwelling-site near Cane Creek, Colbert County, Alabama.

Beginning at the mouth of Cane creek and extending down along the bank of Tennessee river, on property belonging to Mr. R. M. Garner, who resides about a mile back in the hills, is a dwelling-site where a small amount of work was done by us, resulting in the conviction on our part that burials in the site must be widely separated. One skeleton was found, however, with no artifacts in association, which proved to be of interest as presenting an unusual form of burial. The body had been bent and flattened, the head resting upon the pelvis, the right humerus was parallel to the side of the body, the forearm being closely flexed upon it, the left humerus was extended, the elbow being beyond the head, the forearm flexed, with the hand under the head. The femora were in the same plane as the rest of the skeleton, but widely separated, the legs closely flexed against them, as shown in Fig. 29.

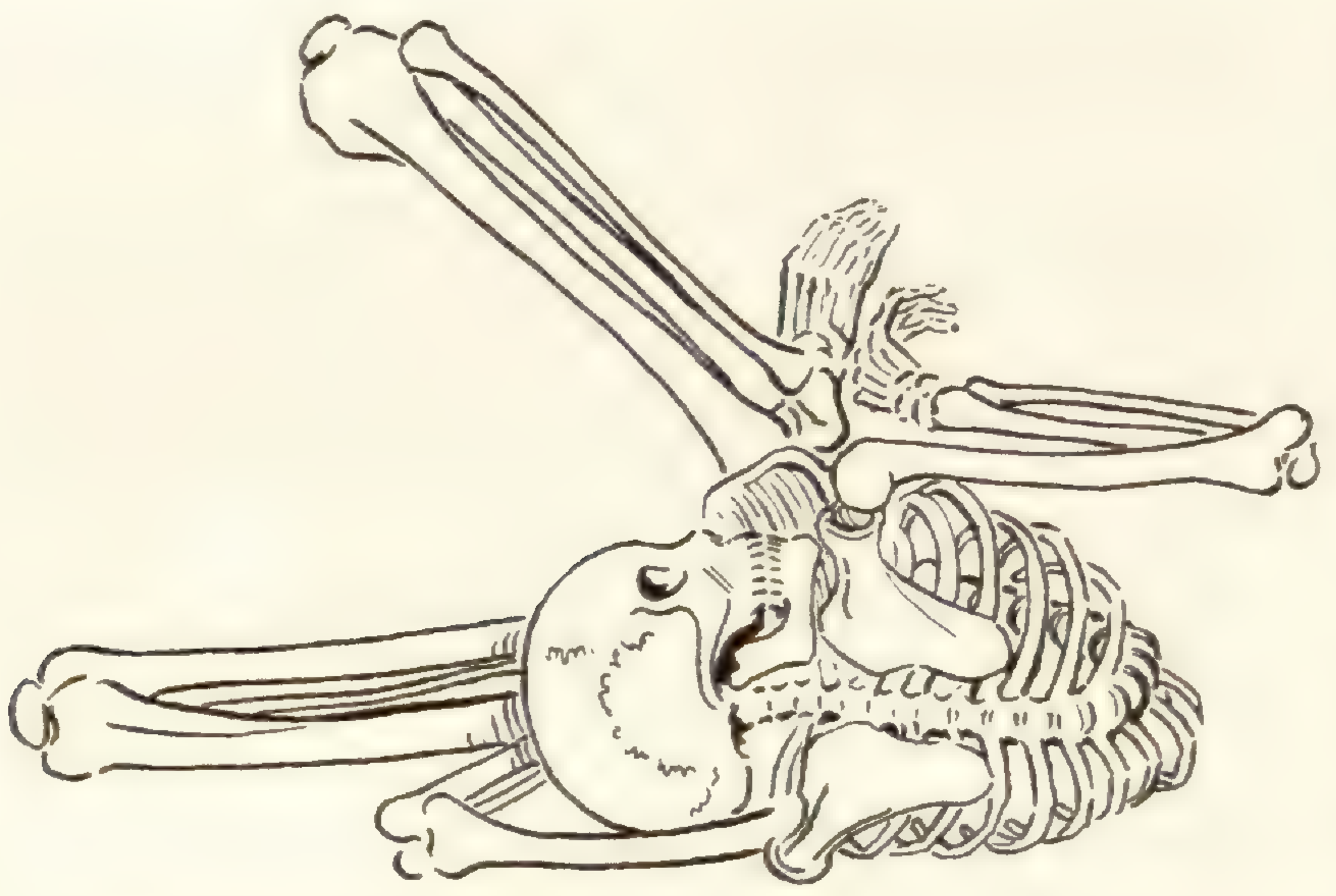

Fig. 29.—Burial near mouth of Cane Creek, Ala. The trunk and the extremities are in the same plane.

To one looking down into the grave, the burial, flattened out on one plane, with its various projections, presented a curious appearance.

Mound and Dwelling-sites on Seven Mile Island, Lauderdale County, Alabama.

Seven Mile Island, whose length is nearly that implied by its name, abreast of the town of Sheffield, Ala., as to its upper extremity, belongs to Mr. F. M. Perry, of Florence, Ala., who kindly placed it at our disposal for investigation.

About one-half mile from the lower end of the island is a small dwelling-site in a cultivated field, distinguished by much darker soil than that of the rest of the field, and having a few shells and fragments of flint on the surface. Burials probably had been made in this site, and in fact a single human tibia was unearthed, but an investigation that was far from exhaustive, however, shells closely packed retarding the work, failed to find any.

About 2.5 miles from the head of the island, near its northern side, is a mound having little shape at present but seemingly one of the domiciliary class, 11 feet in height, the base being about 110 feet square. The mound is completely covered by a large barn and its adjuncts.

A few yards NE. from this mound, which stands in a cultivated field, is a slight rise having no shells on the surface or interiorly. A few fragments of flint, however, lay upon the ground.

Fifteen trial-holes which reached undisturbed clay at a depth of from 2 to 3 feet, variously, came upon two burials, one of which, about 10 inches down, badly decayed, evidently had been at full length.

The other burial, at a depth of 2.5 feet, had but little left. Near a few fragments of bone were several arrowheads, and in the soil which had been thrown out were others, all presumably having been in a deposit with a burial, with which also had been a mass of pure clay about the size of a woman's fist.

Fig. 30.—Arrowhead of flint. Seven Mile Island, Ala. (Full size.)

These arrowpoints, twenty in all, delicately made, all triangular, except one which, differing in shape from the others, is shown in Fig. 30, ranging between 1.1 inch and 1.7 inch in length, are of flint variously pink, light brown, gray, red.

About one-half mile from the head of the island is a small dwelling-site distinguished by a slight rise above the general level and by the presence of scattered shells on the surface. On this rise was a number of frame structures covering much of it. Some digging where space could be found reached a skull at a depth of 16 inches and a skeleton of a child somewhat deeper. A number of rude knive s of flint were found in the soil apart from burials.

Mound near Florence, Lauderdale County, Alabama.

The town of Florence is about one mile from the river. A short distance from the landing and beside the road leading to town is a mound in a cultivated field belonging to Mr. George P. Jones, of Florence. This mound, the largest

on Tennessee river, as we have stated elsewhere, 42 feet in height, quadrilateral with a flat top, is not rectangular, one end being longer than the other. Neither sides nor corners are directed in a significant manner. The mound, the sides of which are so steep that they are ascended with difficulty, apparently has had at the eastern side a causeway, now almost worn away. The basal diameters of the mound are 310 feet NE. by E. to SW. by W., and 230 feet SE. by S. to NW. by N. The diameters of the summit-plateau in the same directions, respectively, are 145 feet and 94 feet. The ends, however, of the plateau were 86 feet and 50 feet.

Fig. 31.—Vessel of earthenware. Gilchrist Island, Ala. (Height 5.3 inches.)

On the chance that burials had been made in the summit-plateau of this great mound, thirty-four trial-holes, none less than 4 feet in depth, were put down without so much as encountering a bone, an arrowhead, or a fragment of pottery.

In the field adjacent to the mound were several rises just above the level of the surface, on which was some scattered midden debris including half of a banner-stone of banded slate, of the type of the double-bladed axe.

Dwelling-site on Gilchrist Island,[1] Colbert County, Alabama.

About one mile inland, in an easterly direction from the principal landing on Gilchrist Island, of which Mr. William Richardson, of Florence, Ala., is owner, is a small field surrounded by woods. In the eastern part of this field is a gradual rise having a maximum height of about 4 feet and basal diameters of 190 feet and 210 feet. The surface is covered with fragments and chips of stone, mainly flint, but implements, whole, broken, or in any stage of manufacture were extremely rare.

Considerable digging in this rise showed a foot or more of black soil containing quantities of chips and fragments of flint. Beneath was midden soil having a large proportion of shells closely packed. Burials seemed to have been made here and there throughout the rise, but nowhere closely associated. A structure, however, on the central part of the rise prevented our digging in that part of it.

Five burials were encountered, three of adults, two of children. Of the adult skeletons, two were in flexed positions and one had been disturbed in aboriginal times.

The two children lay together, a young child along the legs of a larger one which had, at the right side of the body, two masses of rock and two others at the left of the head. On the legs of this burial was a fragment of a large vessel of earthenware, the concave side uppermost. In this stood a vessel of the type first found by us at Baugh's Landing, having extensions on opposite sides and loop handles (Fig. 31).

Dwelling-site at Lock Number 3, Lauderdale County, Alabama.

At Lock Number 3, in the Musselshoals[2] canal, where Bluewater creek enters the Tennessee, is a large, aboriginal dwelling-site, said to belong to a Mr. Huston, of Memphis, Tenn. The site has been washed by rain after cultivation to such an extent that the midden soil has practically disappeared, leaving on the surface an enormous quantity of fragments of stone, mostly a coarse chert which would hardly lend itself to superior workmanship. Among the debris were "wasters" and uncompleted implements, and some rather rude tools, evidently finished though few were entire, as doubtless, in the course of years, they have been plowed up and plowed under and occasionally struck by the heavy knives of cutting machines used in clearing the field of cotton-stalks.

A brief search of the surface yielded a spade of limestone, some comparatively small, argicultural and cutting implements of flint, barbed arrowheads (some serrated), knives, and other objects. No small, triangular arrowheads were found.

[1] Another Gilchrist Island (locally pronounced Gilcrease), in Lawrence County, figures later in this report.

[2] Almost universally spelled Muscleshoals. The name, of course, is derived from the shell-fish.

Periwinkle Hill, Lauderdale County, Alabama.

At the upper entrance to Musselshoals canal is a large shell deposit called Periwinkle Hill (locally "Pennywinkle") belonging to Mr. T. J. Thornton, living some distance back. The "hill," 12.5 feet in height and 128 feet by 168 feet diameters of base, is flat on top, probably through cultivation. As the "hill" was planted over at the time of our visit, no investigation was attempted.

Dwelling-site on the Weaver Place, Lauderdale County, Alabama.

On the Weaver Place, of which Dr. L. A. Weaver, of Lamb's Ferry, Ala., is the owner, is a slight rise in a cultivated field, 155 feet by 215 feet, in view from the river. This rise, of dark soil having a sprinkling of shell on the surface, is markedly distinct from the ground around it, which is of much lighter shade and has no debris upon it. Trial-holes showed a considerable proportion of shell mingled with the soil and reached undisturbed earth about 3 feet 8 inches from the surface. Three burials were found, two of which had a single pebble each, of circular outline, which probably took the place of discoidal stones. A number of rude knives were met with on the surface and in the soil.

Mound on Tick Island,[1] Lawrence County, Alabama.

On Tick Island, of which Mr. R. N. Harris, of Florence, Ala., is the owner, is a sand mound about one mile from the upper end of the island, near its northern side, in sight from the water, did not trees intervene. The mound, about circular as to its base, has a diameter of 60 feet; its height, taken from the outside, around which depressions made it difficult to do with accuracy, was slightly more than 6 feet.

From the northern side of the mound is an extension 34 feet long to where it joins the mound, and 44 feet in width. This extension does not slope upward to the top of the mound, but joins it about midway, where its height is 3 feet.

There had been some previous digging in this mound, but the holes had been of inconsiderable size and comparatively shallow. An excavation by us, 14 feet square, came to light-yellow sand at a depth of 5.5 feet, differing considerably from the darker sand of the mound, and though the digging was carried to a depth of 7 feet and to 8 feet in places, no distinct basal line was seen. Presumably the different colored sand was the underlying soil.

Burial No. 1, disturbed fragments of bones near the surface.

Burial No. 2, 14 inches down, remains of a skull and a femur lying together. With these was a mass of galena (lead sulphide) about the size of a woman's fist, rounded as by grinding, and two vessels of very inferior ware, as were all from this mound, one an undecorated pot, the other belonging to a class found in northern Alabama, of which we are showing numerous examples (Fig. 32).

[1] To avoid confusion it may be well to say that a mound on Tick Island, Florida, has been investigated and described by us.

Burial No. 3, two femora not in order, with an undecorated pot having two loop-handles.

Burial No. 4, three feet down, fragments of a skull and part of a femur together. With these were an undecorated pot and one having two small, horizontal, opposite extensions from the rim.

Burial No. 5, fragments of crowns of teeth in a grave whose base was 6 feet 6 inches deep, filled in with the dark sand of the mound. With the teeth was

FIG. 32.—Vessel of earthenware. With Burial No. 2. Tick Island, Ala. (Height 6.2 inches.)

a celt (which was presented to the owner of the mound), 8 inches long and, like nearly all the celts from this region, carelessly ground, having depressions that for neatness of appearance should have been obliterated.

A considerable number of objects were taken from the mound, having no burial in association, though presumably most of them had been with bones that had decayed away. A well-preserved, spool-shaped ornament of copper, around the central part of which was a cord preserved by the deposit of carbonate on the metal, lay in the sand near a former digging. Three agricultural implements of shale, the largest somewhat more than one foot in length, were found

separately, as were three earthenware vessels, broken, like all from this place, two of the class having oblique extensions and loop-handles with knobs, one of which is shown in Fig. 33, and one a small, undecorated bowl.

Fig. 33.—Vessel of earthenware. Tick Island, Ala. (Height 5.3 inches.)

Together and certainly a mortuary deposit whose burial had gone through decay, 5 feet deep, were twenty-five masses of galena, some rounded, the largest about the size of a goose-egg; two fragments of flint; several masses of clay, not pure clay such as we often see described in this report in connection with burials, but having a considerable admixture of sand.

Four slabs lay together near the surface of the mound and evidently had been disturbed by previous digging, an unfortunate occurrence, for if a stone grave had been present in this region it would be interesting to know it.

An excavation 10 feet square, in the extension, came upon traces of a skull near which were traces of femora and tibiæ in order, all in a position indicating a flexed burial. On the base, 3 feet 10 inches deep, were traces of a skull and of other bones. Above the skull lay a very rude, agricultural implement of shale, 1 foot 4.5 inches in length and 5.25 inches wide. With it were two fragments of flint.

Mounds above Nance's Reef, Lauderdale County, Alabama.

About one-half mile above Nance's Reef, one of the most dangerous parts of Tennessee river, on property belonging to Mr. W. F. Harrison, who resides on it, is a mound on high ground, in full view from the river, about 110 feet across its base of irregular outline, and 8 feet 9 inches high. This mound, mainly of clay, had been plowed over for many years, making it hard to determine what its original shape had been. Seemingly, however, it had belonged to the domiciliary class.

Fig. 34.—Vessel of earthenware. Sycamore Landing, Ala. (Height 5.1 inches.)

The mound, at the time of our visit, was covered with growing wheat, but arrangements were made to put down a hole 10 feet square. The excavation, however, was abandoned before the base was reached.

About one-half mile easterly from this mound is a low rise largely of shell, which we did not investigate.

Mound near Sycamore Landing, Lawrence County, Alabama.

Almost at the water's edge, in full view from the river, about .4 mile above Sycamore Landing, is a mound on property of which Mr. J. H. Gilchrist, of Courtland, Ala., is owner. The mound, 6 feet 8 inches high, with diameters of 65 and 75 feet, evidently has been quadrilateral and still has a flat top—doubt-

less a domiciliary mound. About centrally an excavation 10 feet square was put down, reaching a dark line 7 feet deep over undisturbed, yellow sand. Traces of two skulls were found separately, somewhat less than 2 feet down. With one was a vessel in fragments, of a kind found by us in this region, which, put together, and restored somewhat, is shown in Fig. 34. The ware is thick and coarse.

About 3 feet down were remains of a flexed burial with which was a large fragment of an undecorated vessel of earthenware. A small pot without ornamentation was found apart from bones.

We note in this mound no burials lower than 3 feet and conclude it to have been a domiciliary mound having superficial burials.

Dwelling-site on Gilchrist Island, Lawrence County, Alabama.

On Gilchrist Island, on property belonging to Prof. J. H. Patterson, of Nashville, Tenn., about midway as to the length of the island and near its southern side, in a cultivated field that is comparatively level and shows no trace of midden debris, is a hump 195 feet by 305 feet, approximately, in basal diameters and about 7 feet in maximum height. This hump is superficially covered with dark soil greatly differing from that of the surrounding field, and having sprinkled through it fragments of musselshells and quantities of periwinkles (*Campeloma ponderosum*). About 2 feet down our trial holes came to almost solid shell, encountering disturbed human bones near the surface in one instance, and a disturbance about 20 inches down, evidently not due to cultivation of the field. This site is similar to that near Milton Bluff, to be described next in this report, and belongs to a class that seems to offer little inducement to the investigator.

Dwelling-site above Milton Bluff, Lawrence County, Alabama.

About one mile above Milton Bluff and 200 yards from the water is a mound in a cultivated field on property belonging to Miss Lucy L. Wheeler, of Wheeler, Ala. This mound, rising from level, bottom land, is said to have bordered the river within memory of man, the intervening ground having formed in comparatively recent years. The height of the mound is about 9 feet, its basal diameters 180 feet and 335 feet, approximately. Its surface was thickly strewn with shells and fragments of stone.

Eight trial-holes showed the first two feet of this mound to be of midden soil, below which was a mixture of earth, musselshells, and *Campeloma ponderosum*, a univalve, closely packed. Digging through this material made slow progress. Four burials were discovered as follows: scattered bones near the surface; adolescent closely flexed on the right, about 3 feet down; a child at a depth of 22 inches; adult closely flexed on the left, nearly 4 feet deep.

As our deepest hole was but 5 feet 3 inches and still in masses of shell, we cannot say if this mound was in part natural or wholly artificial. Probably,

however, as the ground surrounding it was level, alluvial land, the mound was a mass of shell down to the surface of the field and not a shell-heap on an eminence.

A thorough examination of this shell-heap would require far more time than its character and the probable absence of artifacts with the burials would justify. In the digging were found several rude knives of flint, an axe 4 inches in length, having a double groove, the poll, unfortunately, somewhat broken.

On the surface were several knives or arrowheads, of flint, and an agricultural tool of limestone, about 8.5 inches in length.

About one-quarter mile distant from this shell mound, on high ground farther in from the river, is what is believed to be a mound by those residing nearby, but which our agent reported to be in reality a natural ridge.

Mound on Brown's[1] Island, Lawrence County, Alabama.

At the upper end of Brown's Island (and we several times have occasion to note that a number of islands in Tennessee river have mounds so situated), which also is called Knight's Island, its owner being Mr. John W. Knight, of Decatur, Ala., is a mound quadrilateral with flat top, somewhat rounded in outline. Its height is 9.5 feet; it is about 90 feet square.

An excavation 10 feet square reached scattering shell at a depth of 9 feet and came to undisturbed, yellow sand six inches deeper. Probably the mound had been built on a dwelling-site. At one place, the dark, loamy sand of which the mound was composed continued down mingled with shell to a depth of 12 feet from the summit, or about 2.5 feet into the undisturbed sand. There was not the appearance of a pit at this place, it seeming rather as if the mound had been built on a rolling surface, such as the ground is today through wash of water when the river is high, and that the lower level had been raised with midden soil to the general level and then the mound carried upward from that. Nothing in the way of bones or of artifacts was found or expected in this domiciliary mound.

Dwelling-site at Brown's Ferry, Limestone County, Alabama.

At Brown's Ferry is a large property which belonged to the late Henry Warten, of Athens, Ala., who most kindly had placed his twelve thousand acres of land along Tennessee river at our disposal.

On high ground just back of the bottom land at this place was a large, aboriginal dwelling-site, on the surface of which were shells and fragments of stone. Most of this site, unfortunately, at the time of our visit was covered with growing oats. In certain parts of the site not under cultivation, digging at random (there were no rises to indicate where investigation might be rewarded) was attempted

[1] This name has been selected because it is employed in the "Index Map of the Tennessee River, Survey of the Middle Section, House Document No. 360." The island, however, is also well known as Birkett's Island and Robinson Island, names of former owners.

without success and with but little encouragement as the midden soil was of inconsiderable depth.

Dwelling-site on Mason Island, Limestone County, Alabama.

About 200 yards below the upper end of Mason Island, which is about four miles long, on property of Mr. J. Greer Mason, of Athens, Ala., is a landing where, on the border of a cultivated field near the river, is an aboriginal dwelling-site of small proportions, marked by the presence of shells on the surface.

At the upper end of this site is a slight rise of irregular outline, about 60 feet by 75 feet in extent, containing much shell, loosely packed, however, and comparatively easy to dig. The maximum depth of the shells and midden soil was about 3.5 feet.

This rise was almost completely dug through by us, yielding fifty-two burials, of which twenty-two were of infants or of older children. The adult and adolescent burials, with one exception, the skeleton of an adult extended on the back, were all in some form of flexion, wherever it was possible to determine. There had been, however, much disturbance caused by intersecting burials. No interments were found at a depth greater than 38 inches, except in the case of a grave which will be described in due course. Undisturbed alluvial soil was reached about 3.5 feet down.

The description of all burials accompanied by artifacts is given in detail.

Burial No. 3, a disturbance. At the feet was a barrel-shaped object of limestone, sometimes called an anvil-stone, 3.4 inches in height and 3.5 inches in maximum diameter. This particular stone, however, can hardly have been used where blows were struck, as the symmetrical depression at each end is smooth, in fact almost polished.

Burial No. 4, adolescent, the bones somewhat disturbed. At the pelvis, together, were: a celt of indurated shale, 2.4 inches in length; a pebble about 5 inches long, resembling a celt in shape; a pebble circular in outline; a commonplace pipe of earthenware, having a band of notches encircling the opening.

Burial No. 5, a disturbance. Near the skull was an undecorated pot having two loop-handles.

Burial No. 6, partly flexed on the right. Standing in front of the thorax (the burial, of course, lying on its side) were a bowl and a bottle without decoration, and a pot having a very rude, cross-hatched, incised design around the neck. The skull of this burial, which lay at a depth of 2 feet, was saved.

Burial No. 8, partly flexed on the left, 32 inches down. Near the skull, which was saved, was a small bowl having had as an ornament an effigy of a head projecting vertically.

Burial No. 9, partly flexed to the right. Near the skull were an undecorated bottle having a flat, projecting base; an undecorated pot having two loop-handles; another pot also with handles, having a rude line and punctate decoration on the body.

Burial No. 12, a young child. A stain from a salt of copper was on the face. This skeleton lay with that of an adult, the skull of the child at the knees of the other burial and directed toward the feet.

Burial No. 16, partly flexed on the left. An ear-plug of the pin-shaped variety and of considerable length lay at each side of the skull, at the right of which was a rude pot having two loop-handles, and coarse, lined decoration on the body. Near the top of the head was a vessel in fragments, having had four equidistant knobs around the opening. Near the chin was a shell gorget, scal-

Fig. 35.—Earthenware vessel coated with carbonate of lime. With Burial No. 16. Mason Island, Ala. (Height 8 inches.)

loped and bearing a triskele design on one side, rather carelessly executed. Alongside the left shoulder was an undecorated pot having two loop-handles and containing a pair of spoons carved from musselshells.

At the outer side of the left humerus stood a bottle having a spherical body, the base flattened, 8 inches in height and 9.6 inches in maximum diameter (Fig. 35). The neck of this bottle, having a diameter of 3.1 inches, apparently had been broken off in part, and the remainder, .8 inch in height, had been smoothed along the line of fracture. Probably but little of the neck had been lost, however, as a bottle similar in shape, having a comparatively short neck, was found at

this place later in the investigation. On this bottle with Burial No. 16 is a white coating which is not kaolin, the pigment used on most vessels having a decoration in white, but proves to be carbonate of lime.

Somewhat farther up Tennessee river, with Burial No. 53, Mound A, the Roden Mounds, was a small mass of white material which evidently had been interred with the burial as an offering. This material was determined to be calcium carbonate, carbonate of lime, and practically the same as found by us on the bottle. Referring to the deposit in the Roden Mound, Doctor Keller writes:

"I have examined the lump of calcium carbonate and find that it is more dense and distinctly harder in the interior. Whether the soft, chalk-like layer on the outside is the result of weathering or due to the action of heat and subsequent absorption of carbonic acid is difficult to determine.

"As there is no sharp line of demarcation I rather incline to the belief that the alteration was caused by atmospheric action."

To digress a moment, we have spoken, in connection with this burial, of ear-ornaments like large pins in form. We are inclined to believe that these pin-shaped objects were all ear-ornaments, as we know some of them to have been, and that those having long shanks were passed through the lobe of the ear, the shank being held in place by masses of hair. These pin-shaped ornaments of shell, of whatever size they may be, are almost invariably found in pairs, one at each side of the skull, unless there is evidence of disturbance in connection with the burial. Moreover, some of them have a groove immediately back of the globular head, which evidently is intended to accommodate the lobe of the ear. However, it is possible some of the longest ornaments of this shape may have served as pins in the hair, though we have found even this form in place at each side of the head of a burial.

And now to return to the burials.

Burial No. 17, a child. At the neck and extending down the body were ten massive shell beads and one small one, all well preserved, the largest 1.3 inch in length and 1.1 inch in maximum diameter. Near the skull was a celt of indurated shale 4.4 inches in length.

Burial No. 19, a child. Under the right elbow lay a bicave stone of quartz slightly less than 2.5 inches in diameter, having an interesting feature sometimes noticed in these stones in that each side may be said to have a double depression, the main ones having centrally each a smaller one about fitted in size to accommodate a finger tip. Probably this stone was rolled by a juvenile player in the game of chungkee, as the children of the Wedauan people of New Guinea[1] hurl spears and sharpened sticks at a cocoanut rolled along the ground. The course of this chungkee-stone would be slightly erratic, however, the stone being somewhat asymmetrical, a fact which might add interest to the game.

[1] Henry Newton, "In Far New Guinea," p. 63.

Burial No. 21, an infant. Near the skull were five shell beads and two shell ear-plugs of the pin variety, each .9 inch in length. One of these minute ornaments was found in place, but the other, disturbed by a blow of a spade in its neighborhood, required work with a sieve for its recovery.

FIG. 36.—Ornaments of wood, copper-coated. With Burial No. 22. Mason Island, Ala. (Full size.)

Burial No. 22, a child. At the feet were two hollow, wooden ornaments, copper-coated, containing small pebbles, shown in Fig. 36, one open, the other as found.

Mr. Charles C. Willoughby considers these ornaments to be representations of the pod of the milkweed plant. This type of ornament was found by us in the mound on the Bennett Place, below Chattanooga, and also in a mound in Arkansas. Herewith is given a note on the subject of ornaments of this class, kindly prepared for this report by Mr. Willoughby.

"*Dear Mr. Moore:* In the Peabody Museum of Harvard University are two pairs of ear pendants similar to those of which you send photographs; they are, however, without expanding tips. Each pendant of the first pair is perforated near the larger end, and closely resembles the one obtained by you from a mound in Calhoun Co., Arkansas, and which you figured on page 93 of the report of the Antiquities of the Ouachita Valley. They were obtained by Mr. Edwin Curtis in 1878 while working for the Museum, and are described and illustrated on pages 112–113, volume III, of the Peabody Museum Reports. Professor Putnam says: 'They are made of wood which, after being carefully shaped and smoothed, was split lengthwise for the purpose of making a symmetrical and smooth oval cavity. . . . In the cavity small pebbles of quartz were placed, . . . which would give a slight jingling sound as the head of the wearer was moved about. The two pieces were then put together and held in place

by a covering of very thin plates of copper, which were firmly united by pounding and rubbing until an even and smooth surface was secured. Through the upper end a hole was made by which the pendant was fastened to the ear.' These were found, one on either side of the skull of a skeleton, in a stone grave mound, Harpeth River, central Tennessee. At the time that the above description was written, but one of the pendants had been opened. This had probably been done in the field by Mr. Curtis. Noticing that the ornament represented the seed pod of some species of the genus *Asclepias* I opened the other specimen with the result shown in Fig. 37, where the ornaments are pictured with a pod

FIG. 37.—Pair of ear-ornaments. Harpeth River, Central Tennessee. To the right, pod of *Asclepias cornuti.* (Full size.)

of *Asclepias cornuti.* As will be seen, the pebbles, which represent the seeds, are carefully placed in position just within the walls of the pod, upon a mass of fiber, which fills the remaining space in the cavity. The fiber undoubtedly represents seed down, which is especially conspicuous in the milkweed. This fiber is now of a deep brown color. It may have been from the stalk of the *Asclepias,* the fiber of which was used for cordage, although less extensively than that of *Apocynum.* The milky juice of this plant was used by some of the California Indians to make the pattern of tattoo marks on the skin, and to hold the soot while being pricked into the surface. Unfortunately but little is known of the ethno-botany of primitive America, and the extent to which various plants entered into the ceremonial life of the Indians can only be surmised. It is probable, however, that some mystic significance was attributed to the milkweed and that these pendants embodied that power.

"The second pair of ear ornaments in the Peabody Museum are shown in Figs. 38, 39. They formed a part of the collection of the late Dr. George

FIG. 38.—Ear-pendants from burial at Letterman, Ark. (Full size.)

FIG. 39.—Side view of pendant from Letterman, Ark., and side view of a pod of *Asclepias cornuti*. (Full size.)

J. Engelmann and were obtained from a burial at Letterman, Arkansas. Both had been opened and their contents lost with the exception of six pebbles. The wooden portion of one of these ornaments is in an excellent state of preservation and is a beautiful example of working in wood by primitive processes, the walls surrounding the inner cavity being only about one sixteenth of an inch in thickness. The sheet copper which encased the wood has corroded and nearly all flaked off. It will be noticed that a wooden plug is inserted in a hole at the larger end and represents the stem, a feature also present in the pendants secured by you at Mason Island, Alabama.

"The pods of the 40 or more species of *Asclepias* found within the United States vary considerably in size and shape. Some are long and slender, others are short and thick. In looking over the collection in the Gray Herbarium of Harvard University I found none with expanding tips corresponding to the form shown in the pendants from Mason Island. This feature may have been exaggerated in the ornament. It is possible, however, that the Mason Island specimen may represent the pod of a different plant, the nature of which is unknown to me."

Fig. 40.—Showing method of suspension.

Burial No. 23, partly flexed on the right. At the right shoulder was a pot having four equidistant, horizontal projections from the rim, which would serve to keep an encircling cord in place, while back of the trunk was a pot, undecorated save that two opposite projections were present at the opening, extending horizontally. In each of these projections a space is present through which a cord attached to one enclosing the neck could pass vertically (Fig. 40). A considerable deposit of soot is on the body of this vessel, which fact might indicate that the vessel sometimes had been placed on a fire and sometimes suspended when cooking was not in progress, for if suspended over a fire presumably the cord would risk destruction. At the knees of the skeleton was a pot having two loop-handles, and four lobes around the body (Fig. 41), which is shown not on account of any excellence possessed by the vessel, but to illustrate the pottery of the region.

Burial No. 24, an infant. At the cranium lay a vessel from the rim of which were numerous horizontal projections.

Burial No. 26, partly flexed on the right. In front of the thorax had been placed a rude, undecorated pot.

Burial No. 28, adolescent, partly flexed to the left. At the skull, together, were a pot with two loop-handles, and a bowl having an effigy of an animal's head rising from the rim, a conventional tail being on the opposite side.

Burial No. 29, a child. At the head was a pot having two loop-handles. On the thorax, with two shell beads, was a scalloped, shell gorget having two perforations for suspension and on the concave side two concentric circles, the outer one being in line with the perforations. Below the gorget was an ornament of the pin-shaped variety. An undecorated bottle, 8.3 inches in diameter, having a wide neck 1.1 inch in height, was at the pelvis. As a rule in this site the vessels of a size for use by adults had been placed with burials of children, which usually is not the case elsewhere.

FIG. 41.—Vessel of earthenware. With Burial No. 23. Mason Island, Ala. (Height 3.8 inches.)

Burial No. 32, closely flexed on the right. At the head was a pot having knobs around the opening, and containing a small pot having had two loop-handles, one of which was missing.

Burial No. 33, a child. On the side of the head was a pot having two loop-handles, and inside it a shell spoon and two flat beads made from a very thick musselshell, one of which broke into flakes on removal. On the opposite side of the head was an undecorated bottle having a wide mouth. Also near the head, where probably it had fallen from the thorax, was an undecorated gorget of shell. In position at the neck, where most likely they had been attached to the gorget, were a number of shell beads and two small, baroque pearls, pierced for stringing. At the feet was an undecorated pot having a pair of loop-handles. This vessel was badly broken, as were nearly all the earthenware vessels found at this site.

Burial No. 34, closely flexed on the back. At the left shoulder was a bowl having a crimped decoration at the margin, inside of which was another bowl

having the head of a bird and a conventional tail on opposite sides by way of decoration. At the left humerus was a bowl with a beaded margin. An undecorated bottle in fragments and a large pot lay along the left shoulder and elbow.

Burial No. 35, a child. Small shell beads were at the neck, and at the right side was a pot having two loop-handles, knobs being on the handles and around the margin of the vessel, in which were two spoons carved from musselshells.

Fig. 42.—Vessel of earthenware. With Burial No. 49. Mason Island, Ala. (Height 6.6 inches.)

Burial No. 37, partly flexed to the left. At the right shoulder was an undecorated pot having two loop-handles. The skull of this burial was saved. Judging from the appearance of the bones at this site, their condition was excellent, but a kind of dry rot seemed to have affected them and comparatively few were in a condition to save.

Burial No. 38, a child. On the thorax was a small conchshell (*Busycon pyrum*), its beak toward the chin of the skeleton, it evidently having hung in that position with the aid of a small perforation at the end of the beak. With it was a shell spoon.

Burial No. 39, closely flexed on the right, in a grave elliptical in outline, 3 feet 10 inches long by 2 feet 10 inches in maximum width and 4 feet deep, was a skeleton without accompanying artifacts, details of whose burial we include as it was the only unmistakable grave found in the site.

Burial No. 40, closely flexed to the left. At the left of the skull was a bowl having had the effigy of a head rising from the rim and a conventional tail on the opposite side. With this was a pot having four horizontal projections from the rim. The skull of this burial was in condition to keep.

Burial No. 41, partly flexed to the right. At the pelvis was a large bowl, a cooking vessel covered with soot, having four horizontal projections near the rim, ornamented with small notches on the outer margins.

Fig. 43.—Vessel of earthenware. Mason Island, Ala. (Height 4.1 inches.)

Burial No. 42, partly flexed to the right. At the right humerus was a discoidal of jasper breccia, 3.5 inches in diameter. This stone has an effective appearance, not through excellence of treatment but owing to its component parts, some of which are yellow, others red, the setting of all being chocolate in shade. At the right elbow was a discoidal of limestone, 2.5 inches in diameter.

Burial No. 45, closely flexed to the left. At the left shoulder and elbow was a large pot having a number of horizontal projections around the rim, and another pot decorated in the same way with knobs.

Burial No. 49, a young child. At the pelvis was a vessel having two projections from the rim at opposite sides, under each of which was a loop-handle. Around the upper part of the vessel are four encircling, parallel rows of knobs (Fig. 42). This vessel belongs to a class which, as we have before said, seems to be frequently met with in northern Alabama.

In the digging, away from bones, were: a vessel of earthenware (Fig. 43); ten arrowheads and knives of flint, found singly, four of which are triangular

in outline; a disc of wood, copper-coated, 1.9 inch in diameter, evidently part of an ear-plug; the skull of a dog; a bone of a turkey; several piercing implements of bone; part of an antler smoothed at both ends, possibly intended for a handle; a discoidal of quartz, 3 inches in diameter; a graceful lancehead of flint, 3.75 inches in length.

A pit of considerable size, traceable from the surface down, filled with shells and some midden soil, probably had been in use for refuse. At all events no bones were present in it.

Digging in other parts of the site was without success, no place being found where the midden soil was of any considerable depth.

Mound on the Steel Place, Limestone County, Alabama.

On a property said to belong to Mr. Arthur Steel, residence unknown, is a mound a few yards from the landing, about 12 feet in height. This mound, which evidently has been a domiciliary one, has been cut away in part to permit the erection of a building. We were informed by a tenant that nothing had been found at the time of the partial demolition of the mound. A short distance from this mound is a small one, evidently much worn away, on which is a building. No digging was done by us at this place.

Mound at Decatur, Alabama.

In the yard of the H. H. Hitt Lumber Company, of Decatur, Ala., is a mound somewhat the worse for time, about 10.5 feet in height and approximately 80 feet and 95 feet in diameters of base. The mound evidently had belonged to the domiciliary class, and although Mr. Hitt, president of the company, placed it at our disposal, we decided, under the circumstances, it would be inexpedient to dig into it, as mounds of this kind, as we so often have had occasion to say, rarely yield any return.

Mound and Dwelling-site near South Flint River, Morgan County, Alabama.

On the river bank, about 100 yards above the mouth of South Flint river, on property belonging to Mr. J. B. Gilchrist, of Courtland, Ala., was a mound 5 feet in height and 45 feet across its base, which was about circular. This mound had been dug into previous to our coming, but though the hole, which was central, had been of considerable size at the surface, it converged suddenly and before reaching the base of the mound was of insignificant proportions.

An excavation 16 feet square was put down by us, showing the top of the mound to be 6 feet 3 inches above the base, which consisted of 2 or 3 inches of very dark midden soil, beneath which was a solid deposit of shell, no doubt part of the dwelling-site which was contiguous to the mound. The mound itself was of raw clay without any admixture of organic matter. In the upper two feet of the mound, in addition to loose bones thrown out by former diggers,

three burials of children and one of an adult were encountered, none at a depth greater than slightly more than 2 feet.

Fig. 44.—Bottle of earthenware. Near South Flint River, Ala. (Height 8.2 inches.)

Only a few inches from the surface, apart, were two vessels—one, undecorated, having a short neck, the other, a graceful bottle, its body consisting of four lobes. This vessel, of fairly thin ware in which a small proportion of shell-tempering is apparent, has had a uniform coating of red paint over the

body (Fig. 44). Though no interments were found near these vessels, it is probable they had been with human remains, as both were near the edge of the former digging.

Throughout the rest of the mound, to the base, no burials were met, nor was any artifact encountered with the exception of part of a large axe, apparently of claystone, the posterior part of which was absent, and a rude knife of flint found on the base. No pit extending below the mound was discovered.

Immediately adjacent to the mound was a small dwelling-site which, to some extent, had been cut away by the river that had left exposed parts of human skeletons in two places. Quantities of broken stones, quartzite and flint, lay along the shore, with which was an occasional arrowhead. On the surface of the site, which offered no indication in the way of a rise where digging might be successful, a few arrowheads were gathered, all with stems, some having barbs. Pottery of fairly good quality was either undecorated or bore a check or a cord-marked design.

A limited amount of digging in this site soon came to a thickly-packed deposit of shell where work progressed slowly, and it seemed hardly worth while, under such conditions, to devote a long period to finding, at most a few burials with which, in all probability, nothing had been deposited.

Mound near Limestone Creek, Limestone County, Alabama.

In a cultivated field bordering Limestone creek and in sight from its bank, about 1.5 mile back from the union of the creek with the Tennessee, is a mound on the property of Mr. J. E. Penney, of Birmingham, Ala., who most cordially placed all his various properties along Tennessee river between Florence, Ala., and Chattanooga, Tenn., at the disposal of the Academy for investigation.

The mound, about circular as to its base, had been somewhat spread by cultivation; its diameter was 55 feet. The height of the mound was hard to determine, as it was in part on the verge of, and partly on, a slope, so that its height depended largely on the point from which the measurement was made. From the level of the crest of the slope the mound had a height of 4 feet 8 inches, but later a measurement showed the base to have been slightly more than 6 feet below the summit of the mound.

An excavation 16 feet square, which later was much enlarged in places, was put down, showing the composition of the mound to be of dark, midden soil, almost black as a rule, though near the surface in one part there seemed to be a mingling of clay somewhat lighter in shade.

Thirty burials were encountered, all of which, with one exception, where a quantity of disconnected bones had been interred, were of the flexed form of burial or at full length, so far as could be determined. In the body of the mound especially there had been great disturbance, burials cutting through other burials, leaving parts of skeletons only. Single skulls were encountered also and were classed as burials.

In addition to several burials on the base of the mound, ten graves extended below the base, three of which contained two burials each. The following interments present features of interest in connection with their method of burial or had artifacts with them.

Burial No. 6, an aboriginal disturbance having enough remaining to show the body had been at full length on the back. On the pelvis, its long axis corresponding with that of the body, was an agricultural tool of shale, 1.5 foot in length, neatly rounded at both ends, which were 5.25 and 3 inches in width, respectively, the greater width being ground to a fairly sharp edge

Burial No. 15, the skeleton of a child, lying at the bottom of a grave 3 feet long and 1 foot 10 inches wide, 6 feet from the surface, the grave extending 1 foot 4 inches below the base. At the neck were two thick, discoidal beads of copper.

Burial No. 16, a skeleton extended on the back, the bones of the left forearm missing. Corresponding bones of a left forearm, doubtless the missing ones, were in the soil about one foot above the burial, which lay at the bottom of a pit extending about 2 feet below the base, 8 feet long and 1 foot 10 inches wide. In the grave, beyond the head and the feet, respectively, were single masses of pure clay. In front of the face, which was turned to the right, was a knife or lancehead of flint, 2.8 inches in length. Beyond the skull was a celt of indurated shale, 9.1 inches long. To the left of the pelvis lay a mass of galena, somewhat smaller than a man's fist.

Burial No. 18. About the center of the base of the mound and in contact with Burial No. 19, with whose grave No. 18 formed a right angle, was a skeleton extended on the back in a grave distinct in the red, undisturbed clay (as were all the graves in this mound), 7 feet long by 2 feet 4 inches in width and extending 2 feet below the base. At the head was a mass of pure clay, and four small bits of galena lay together at the right of the pelvis.

Burial No. 19, the skeleton of an adolescent, lay at full length on the back at the bottom of a grave-pit 5 feet 8 inches long by 1 foot 9 inches in width at the end in which the head of the skeleton lay, the foot end of the grave being 1 foot 5 inches across. This pit extended 1 foot 4 inches below the base of the mound.

Immediately on the skeleton and in contact with the limits of the grave on all sides, was a layer of pure, light yellow clay from 2 to 3 inches in thickness, which contrasted markedly with the dark clay of the soil around it, as shown in the illustration (Fig. 45), where the parallelogram is clearly noticeable. At the neck of the skeleton were a few shell beads, badly decayed.

Burial No. 20, a skeleton at full length on the back, in a grave 6 feet 4 inches long by 1 foot 5 inches wide and extending 2 feet below the base, had a mass of clay at the head and another at the feet. In the same grave, its skull 6 inches above the knees of Burial No. 20, was the skeleton of a child (Burial No. 21) lying in reverse direction to the burial beneath.

Burial No. 23, a skeleton extended on the back, in a grave similar to others in the mound, had, beyond its feet, a mass of pure clay extending across the grave.

Fig. 45.—Burial No. 19, a skeleton on the bottom of a grave-pit. The grave was 5 feet 8 inches long and 1 foot 9 inches wide. The bones were covered with a layer of pure clay, as shown. Limestone creek, Ala.

Burials Nos. 24 and 25, a grave 2 feet 3 inches long by 1 foot 8 inches wide, reaching 2 feet 2 inches below the base, contained the bones of an adult and of a child in no order whatever. With this burial were four shell beads, one, one inch in length, the other three each about .4 inch long. There were also two sections of columella, one, .75 inch in length, bored at both ends but without

perforation, and a somewhat shorter section in which no boring had been attempted. With these also were five sections of the body-whorl of a large marine shell, and a pendant from the body-whorl of a similar shell, somewhat less than 3 inches in length, having a groove for suspension at one end and a part broken from the other extremity.

Burial No. 29. This skeleton, extended on the back, lay well out from the center of the mound and beyond our original excavation, at the bottom of a grave 8 feet 7 inches in length and 2 feet wide at the base, where it expanded slightly. From the surface of the slope of the mound to the bottom of the grave was 10 feet 10 inches, the pit extending 6 feet 10 inches below the base. Well up in the grave lay a skull, and other bones were scattered around, showing this deep grave had cut through one or more graves which had preceded it. The burial at the bottom of this grave was covered with a layer of light-colored clay having a maximum thickness of 5 inches. On the upper surface of this layer was the skeleton of a child about 8 years of age, the head in the same direction as that of the skeleton beneath.

Fig. 46.—Arrowhead of flint, showing secondary work. Limestone Creek, Ala. (Full size.)

With several parts of skeletons in this mound, aboriginal disturbances, were masses of pure clay.

Apart from bones, singly, were found eight arrowheads or knives, of flint, all with stems, some barbed, two serrated. One of these latter was of interest from the fact that part of its pointed end having split away, the remainder had been serrated along the line of fracture to continue the point in use (Fig. 46).

There was also in the mound, probably in the midden debris, the jaw of a dog.

All over the field in which the mound was, but in increased numbers in its vicinity, were quantities of pebbles and fragments of stone, much of which was flint, also arrowheads or knives in considerable numbers, some complete, many broken. In addition were picked up at this site a muller of limestone, a celt of claystone, and several rude implements of flint. The arrowheads from this place do not include any small, triangular ones, and as a rule are stemmed, sometimes barbed and, with one or two exceptions, exhibit little evidence of careful workmanship.

On the upper side of Limestone creek where it joins Tennessee river, in view from the waters of both, is an earthwork in the form of a four-pointed star surrounded by a ditch. This earthwork, which the older inhabitants remember to have been thrown up in the Civil War, has deceived the uninformed, who have dug into it extensively.

Dwelling-site on the Hopper Place, Madison County Alabama.

Opposite Bluff City, on property belonging to Mr. W. M. Hopper, who lives somewhat back toward the hills, is a large field bordering the river, having

a sprinkling of shells over most of its surface, and a number of slight rises near the water, on which were more shells than elsewhere in the field. Artifacts were singularly few on the ground, almost nothing being found other than a few small fragments of pottery, one of which had a coating of red pigment.

Considerable digging at this place yielded neither burial nor artifact.

Dwelling-site near Cataco Creek, Morgan County, Alabama.

On the lower side of the mouth of Cataco Creek, known also as Tate Creek, are a dwelling-site and an aboriginal cemetery of importance, according to our agent who visited them, which are under the management of Mr. J. W. Dunaway, of Sommerville, Ala. Permission refused.

Mounds on the Slaughter Place, Morgan County, Alabama.

On the property of Mr. H. B. Slaughter, of Chicago, Ill., of which Mr. John Millow, who lives on the place, is manager, in a cultivated field were two mounds but a few feet apart, about one-quarter mile SW. from the landing. These mounds, blunt cones and symmetrical, were on land that had lately been cleared and were covered with the stumps of large trees. Evidently with the exception of a shallow hole in the top of the larger mound, they had not been dug into prior to our visit. Both mounds were of dark clay, of rather raw appearance, without admixture of midden debris.

Mound A.

Mound A, 7 feet 10 inches in height when measured from the outside, and 50 feet in diameter of base, was dug centrally by us to the extent of an excavation 16 feet square which showed the base of red clay, very distinct from the clay of the mound, to be 7 feet 2 inches from the summit.

Two feet down was a deposit of pure, gray clay differing entirely from that of the mound, 4 feet long by 16 inches wide and 2 to 3 inches in thickness. At one end of this were grouped together twenty-five masses of galena (lead sulphide), the largest 2.5 inches by 1.5 inch by 1.25 inch. Beside these lay a copper celt 4.4 inches in length and 2.5 inches across the blade. Most careful search for traces of bones was made in connection with this deposit, but not even crowns of teeth were discovered, though without doubt a burial had been there.

In the wall of the excavation, 54 inches down, together, were a mass of galena weighing fourteen pounds and an interesting celt of copper, 4.4 inches in length and 2.5 inches in maximum width, flat on one side and convex on the other. If traces of bones were with these objects not any were noticed in the disturbance, the lead and the copper having been dislodged by a blow of a pick before their presence in the wall was known. However, careful investigation showed that no fragments of bone other than possibly very small ones accompanied them.

Apparently exactly in the center of the base of the mound, was a grave, a blunt oval in outline, 7 feet long by 5 feet in maximum breadth, very distinctly defined. This grave, whose sides did not converge, extended 3 feet 4 inches into the undisturbed, red clay. When the grave was dug the red clay had been thrown out around it and apparently had not been used in filling it, as the contents of the grave consisted of the dark clay of the body of the mound.

In the wall of the grave, on one side, were four small offsets which did not extend to its upper level, but apparently had been hollowed out after the grave had been dug. No bones or artifacts were discovered in them.

About centrally on the base of the grave was a mass of pure, gray clay, 2 feet long by 18 inches wide and 3 inches thick. In this clay was a copper celt 3 inches in length and 1.3 inch in maximum width. Almost under the celt was a reel-shaped ceremonial ornament of sheet-copper (Plate V, Fig. 2) about 4 inches square measuring across the extremities, the longer axis of the body and its two perforations longitudinal with the grave. Beneath this ornament were faint traces of bone.

Mound B.

Mound B, 6 feet 7 inches high when measured from the level of the field and 35 feet in diameter of base was investigated by us, a central excavation 14 feet square being sunk to its base, which proved to be slightly more than 6 feet from the summit.

Nothing was discovered in the body of the mound, but almost in the center of the base was an oblong grave extending E. and W., 11 feet 5 inches long by 6 feet wide at the top, but converging to 5 feet 4 inches by 3 feet at its bottom, which was 5 feet below the level of the base. All around this grave, for a considerable distance, was piled clay taken out in its digging—red clay and yellow clay, the red, undisturbed clay having been dug through, and a lower, underlying clay, yellow in color, having been reached and thrown out above the red clay.

As in the case of the grave in Mound A, apparently little if any of the earth that had been thrown out in digging the grave in Mound B had been used to fill it, but seemingly the building of the mound had begun over and around the open grave, the dark material composing the mound filling the grave also.

On the base of this grave, though not completely covering it, was a layer of pure, gray clay, about 4 inches in maximum thickness, of the kind probably used for pottery and similar to the clay found in connection with burials throughout this region.

Under the clay layer, about 2 feet 4 inches from the eastern end of the grave, were two ear-ornaments of sheet-copper, of the spool-shape variety, lying about such distance apart as the breadth of a skull would be. Near these ornaments were fragments of crowns of teeth, stained green from the copper salt.

About 15 inches farther toward the foot of the grave were the fragments of a reel-shaped ornament of sheet-copper, badly decayed, which evidently

had rested on the thorax of the skeleton. Enough of this ornament remained to show that the longer axis of its body and the two perforations had rested transversely to the skeleton.

Farther along, following down the line of the burial, the margins practically in contact, was a similar copper ornament but of much heavier material. The arms of this ornament had been folded back, one above the other across its body, evidently ceremonially. The line of its two perforations lay across that of the former burial, as was the case with the other ornament.

With the exception of part of a drill of flint there were found in these mounds no objects or fragments of stone or of pottery, save in a small pit below the base of one of them, which had been filled with midden debris.

Dwelling-site at White's Ferry, Madison County, Alabama.

At White's Ferry, on property of Mr. Lawson White, of Huntsville, Ala., is a dwelling-site and shell deposit similar to a number along the river in this region. As the site was planted in grass and clover, digging was out of the question.

Mound and Dwelling-site above Chunn's Landing, Morgan County, Alabama.

About one-half mile above Chunn's Landing, in full view from the water, are a mound and a dwelling-site of considerable size, on property of Mrs. M. L. Chunn, living near at hand. The mound, which has an attractive appearance, is about 5 feet in height and 45 feet in diameter, approximately. Permission refused.

Mounds and Dwelling-site on Hobbs Island, Madison County, Alabama.

About one-quarter mile below the upper end of Hobbs Island are two mounds and a dwelling-site on property belonging to Mrs. F. M. Henderson, of Natchez, Miss. We were unable even to measure the mounds at this place (which our agent, before our visit, estimated to be 16 feet and 4 feet in height, respectively), having received notice from the owner not to set foot upon it.

Dwelling-site at the Mouth of Flint River, Madison County, Alabama.

Immediately at the union of Flint river with the Tennessee is an area of very irregular outline, about 135 yards by 85 yards, thickly covered with shells, on the property of Mr. R. A. Parsons, of Taylorsville, Ala. This aboriginal site has upon it at present various structures, and at the time of our visit a part of it was in use as a vegetable garden, so that the space open to investigation was somewhat restricted.

At a point where there seemed to be a rise above much of the remainder of the site, holes were put down, showing the deposit to be almost solid shell at first, then midden soil having a slight admixture of shell, this underlaid again by shell, the whole going to a depth of 6 feet 9 inches, where brown sand with occasional shells was found—even this not being the bottom of the deposit.

Realizing that search at this depth would be inadvisable to prolong, owing to the time required for holes so deep and in view of the fact that burials found had nothing with them, thirteen trial-holes only were sunk in this higher part of the site, resulting in the finding of the skeleton of a child, 26 inches down; a burial closely flexed to the left at a depth of 22 inches; a skull with the two upper vertebræ, 4 feet 6 inches from the surface; a skeleton closely flexed on the left, 1 foot down. A few other holes were sunk in outlying parts of the site, but without success.

Forty inches deep was a deposit of masses of sandstone in single thickness, arranged in the form of a horizontal triangle except for the projection of a stone on one side. This irregular triangle, having a base 29 inches in extent and an altitude of 31 inches, rested on, though it did not completely cover, a fireplace on which was charcoal and ashes. No bones were discovered.

A number of coarse arrowheads and knives, of flint, were picked up at this place, and a barrel-shaped stone (sandstone) with a deep depression at each end, which it was said had been plowed up on the site, was acquired there by us.

In the digging were found a number of arrowheads and knives, of flint; two neatly-made piercing implements of bone; a bone needle 5 inches in length, having an eye .1 inch in diameter. The discovery of a needle of this kind has been very infrequent in our archaeological work.

Dwelling-site near Bean Rock, Marshall County, Alabama.

On property belonging to Mr. John Bogenshott, living nearby, along the river bank below Bean Rock and in sight from it, has been an aboriginal place of abode, largely of sandy loam having shell here and there over small areas. A few arrowheads, broken celts, several whole ones, and bits of pottery bearing a small check stamp were found on the surface. There were also noticed on the ground part of a human tibia and a number of slabs which presumably had been with burials. The place had a history of the discovery of hundreds of arrowheads which had been gathered there and sold. Numerous trial-holes in various parts of this site resulted only in the discovery of the skeleton of a child 46 inches down.

Dwelling-site near Paint Rock Landing, Marshall County, Alabama.

On property near Paint Rock Landing, belonging to Mr. John West, of Guntersville, Ala., is a small camp-site having on the surface little other than a few bits of undecorated pottery and considerable shell in places. The shell

proved to be in deposits about one foot in thickness, below which was midden soil to an inconsiderable depth. We were unable to find at this place any burial or artifact, with the exception of part of a burial near the surface, the rest of which doubtless had been plowed away.

Dwelling-site on the Foster Place, Marshall County, Alabama.

Along the bank of the river, in a cultivated field forming part of the property of Hon. A. M. Ayers, living near Guntersville, Ala., is a small camp-site having some midden debris on the surface, and in places restricted areas where shells were visible. In that part of the site on which shells were not apparent, digging soon reached undisturbed soil and no burials were encountered.

Numerous holes in the shell deposits came upon the burials of three adults and a child, the former in flexed positions.

Burial No. 3 was an adult flexed on the right, lying at the bottom of a grave 28 inches deep, filled with shells to the surface. These shells were without any admixture of midden soil such as we found with the shells in the general deposit.

Burial No. 4, an adult in the same position as the other, lay in a grave 14 inches deep, also filled to the top with shells only.

The burials at this site were widely scattered; in all events careful digging failed to find any in groups.

Thirty inches below the surface was a slab of limestone of irregular outline, 2 feet long and 1 foot wide, approximately. Under this slab and extending beyond it in places, was a deposit of shells,[1] unmixed with midden debris, having a maximum thickness of 5 inches, made up of some musselshells (*Unio*) with an unusual proportion of univalves in addition, the musselshells in many instances still having the two valves in apposition. Below this deposit no burial was found.

One of our trial-holes came upon a large pit which had become filled with refuse, part-way up in which, as though lost there, was a celt of sedimentary rock, 9 inches in length.

Dwelling-site on the Penney Place, Marshall County, Alabama.

On the Penney Place, the property of Mr. J. E. Penney, of Birmingham, Ala., in full view from the river-bank, did not trees intervene, is a small ridge having considerable midden debris on the surface. At each end, though not occupying the entire extremities of the ridge, is a small rise containing shell in considerable quantity in places. These rises, which are 25 yards apart, contained all the thirteen burials found in the place, with one exception, a deposit of fragments of cremated bones 13 inches by 8 inches by 5 inches in maximum thickness, found 1 foot 3 inches below the surface in the ridge.

[1] A selection of shells from this deposit included the following: *Unio gibbosus*, *U. incrassatus*, *Dromus dromus*, *Pleurobema clava*, *Truncilla perplexa*, *Quadrula pyramidata*, *Obovaria circulus*, *Campeloma ponderosum*, *Pleurocera filum*, *P. ungulatum*, *P. nobile.*

The remaining twelve burials, some near the surface, some in deeper graves, were nine of adults, one of an adolescent, two of children, the adults and adolescent all in some form of flexion. Two came from the more northerly rise, the rest from the one at the other extremity of the ridge. The northerly rise was thoroughly dug through by us, but seemed to have been little used as a place of burial; a large pit, however, filled with refuse was discovered in it.

The more southerly rise seemed well filled with interments, and as parts of it were not explored by us a number doubtless were left behind.

Burial No. 2 was at the bottom of a pit 2 feet 11 inches wide by 4 feet 8 inches long, these dimensions being quite sufficient for a flexed burial.

Burial No. 3, without any sign of disturbance, though but 10 inches below the surface, had the skull alongside the pelvis.

Burial No. 6, a child, had in association an undecorated shell gorget (the only object found with a burial at this place), oval in outline, 3.6 inches by 2.7 inches, having a single perforation at the smaller end.

Burial No. 10, a pit 5 feet 2 inches deep, the contents of which, consisting in the main of midden debris, could be traced almost to the surface, had its lower 20 inches, immediately over the skeleton, filled with shell. This grave extended 2 feet into yellow, undisturbed soil.

Burials Nos. 11 and 12. These skeletons, about one foot apart and lying in the same direction, were in a grave 34 inches deep, the lower foot of which had been filled with shells. Though considerable digging was done around the upper parts of these skeletons, no skulls were discovered. Presumably the burials had been made without them, but possibly the crania had been removed in the digging of another grave, traces of which, however, were not apparent.

Found throughout the digging were: several knives of flint; a small anvil stone of sandstone; several piercing implements of bone; rude agricultural tools of limestone; an undecorated pipe of sandstone, having a hole for a stem directly in the bowl.

On the surface was a fragment of pottery bearing a complicated stamp decoration, the tempering being apparently finely ground particles of shell.

Mound near Guntersville, Alabama.

In sight from the steamboat landing at Guntersville, is a mound on property belonging to Mr. Green Seibold of that place, 13.5 feet in height and having diameters of 220 feet and 180 feet. The mound, which has been badly washed, has had a flat top and evidently has been a quadrilateral, domiciliary mound. Three frame structures upon it precluded any attempt at investigation.

Dwelling-site on McKee Island, Marshall County, Alabama.

McKee Island, a short distance above Guntersville, belongs to Mr. T. B. Seibold, who resides somewhat back on the mainland. The island, about one mile in length, has its upper third low-lying, and separated by a small water-

course. The remainder of the island, high ground and fertile soil, has a ridge, probably largely natural, extending through it longitudinally, easterly and westerly, somewhat in from the northern side of the island. On this ridge has been a dwelling-site for the aborigines, whose occupancy, no doubt, contributed somewhat to its height.

Along the middle part of the ridge are various sites once occupied by wigwams, all circular so far as we could determine, except one which was square. The sites were marked by depressions and had been surrounded by small embankments, but as the ground had been under cultivation in the past, exact measurements were not obtainable. Putnam[1] describes sites of this kind, "circular ridges of earth," which were investigated by him in middle Tennessee and which, unlike ours, contained objects of interest. Graves of children only were found by him in these sites.

One of our circular depressions, 32 feet in diameter, was 11 inches below the surrounding level, which perhaps included part of the original embankment. Digging in this site disclosed a fireplace, about centrally situated made up of three layers of burnt clay showing the level of the fireplace had been raised from time to time. Another circular site, 24 feet across, also had a fireplace in the center, approximately, as did still another depression 30 feet in diameter and 1 foot 9 inches deep.

The largest site, 52 feet square, was 1 foot 8 inches below the level around it, part of which was made up by the surrounding embankment, which was 10 inches in height, so that the actual depth of the site below the general level was also 10 inches. In none of the sites was any burial encountered; nor in the largest one, though carefully dug over, was any fireplace discovered, but it is possible that what was sought is beneath a large tree growing about centrally in the depression.

In the square depression, about 8 inches below the surface and having the shape of a wide ellipse of very irregular outline, 25 inches by 27 inches, was an arrangement made up of a single layer of comparatively small slabs and masses, some limestone, some quartzite, all placed in contact one with another. Possibly bones of an infant had decayed away.

On the ridge we have described no mound remained, but the outer part of a low one, which had been perhaps 2 feet in height, had been left by previous diggers, who had piled a number of slabs on the surface. In one spot remaining from the wreck we found scattered bones of a child below slabs of stone. These slabs did not belong to an arrangement made for covering a particular burial, but formed part of what seemed to have been a general arrangement in the central part of the mound, perhaps covering all the burials in it.

[1] Eleventh Rep. Peabody Mus., p. 347 *et seq.* Tidings have come to us at this stage of the printing of our report, of the lamented death of our old friend Prof. Frederic Ward Putnam, which occurred at Cambridge, Mass., August 14, 1915. Professor Putnam expressed much interest in this report on the antiquities of a state in the archæological investigation of which he was so noted a pioneer.

Between where the wigwam sites were investigated and the remnant of the mound, there was, on the ridge, a slight rise, but not of sufficient height or regularity to entitle it to be called a mound. Into this rise a large number of trial-holes were sunk by us, coming on six burials, as follows:

Burial No. 1, partly flexed, the knees to the right, 32 inches down. At one side of the skull, or of what remained of it (for the burials in this place were

FIG. 47.—Vessel of earthenware. With Burial No. 2. McKee Island, Ala. (Height 5.2 inches.)

badly decayed), was an earthenware bowl, undecorated save for a rude effigy of a human head which projects above the margin, and having a conventional tail opposite. On the other side of the cranium was a pot, its body encircled with a line of rude knobs.

Burial No. 2, a child, 2 feet deep, at the head being a stone having a natural formation consisting of a deep concavity. On the other side of the head were an undecorated bottle, and a pot having horizontal projections around the rim, which would serve to keep a cord in place (Fig. 47).

Burial No. 3, partly flexed to the left. Near the skull was an undecorated bottle of excellent ware, having a wide mouth (Fig. 48).

Burial No. 4, a child, having at the skull, which was stained at one place by salt of copper, a pot with two loop-handles, and glass beads in a friable condition. Near what probably had been the leg-bones lay a broken band of sheet-brass curved as for an anklet.

Burial No. 5, a grave extending 2 feet into undisturbed, yellow sand, its depth being 4 feet 8 inches, contained remains of a skeleton partly flexed to the right. At the left of the skull, together, were a deposit consisting of four discoidal stones, each about 1.2 inch in diameter, one having a small depression on one side; a lump of carbonate of lime; two small masses of graphitic material,

Fig. 48.—Bottle of earthenware. With Burial No. 3. McKee Island, Ala. (Height 5.3 inches.)

each showing smoothed surfaces whence probably parts had been ground off for use as paint; three beautiful, triangular arrowheads of flint, ranging between 1.8 inch and 1.1 inch in length, the two largest having long, tapering points and serrated, the smallest similar but to a modified extent.

Burial No. 6, partly flexed on the right.

In this rise also were two arrangements of small masses and slabs, each being about 20 inches by 2 feet, beneath which no burials were found.

With no burials visibly in association were: a beautiful ceremonial axe (Fig. 49), probably of igneous rock, having a blemish on the side opposite the one shown in the illustration, 7.1 inches in length and 2.4 inches across the cutting edge, having the perforation usual in these pieces; an undecorated pot with two loop-handles; a beautiful little implement of flint with expanding blade and curved cutting edge, 2.6 inches in length.

In this rise and in the wigwam sites, found separately, were eight knives and arrowheads of flint, two of the latter being small and triangular.

The lower part of the ridge presented neither wigwam sites nor elevations. It was tentatively dug by us, but no sign of former occupancy was apparent, even the surface being without debris.

Fig. 49.—Ceremonial axe. McKee Island, Ala. (Full size.)

The pottery from this entire site, with one exception, was of coarse, inferior ware, some sherds showing tempering with shell and a small proportion of gravel together. Other sherds had been tempered with what appeared to be small masses of limestone, which react to acid and which are not fragments of shell, their shape being distinctly different.

Dwelling-site on the Seibold Place, Marshall County, Alabama.

Also belonging to Mr. T. B. Seibold is an aboriginal site in a large field on the second river level, on the mainland opposite McKee Island. This site has been plowed away to a large extent, and little remained to mark it save much debris on the surface and a stone grave. This grave, whose upper surface was visible in the field, consisted of masses of rock and water-worn boulders, some double the size of a man's head, many much smaller, thrown together without much attention, two and three deep. This arrangement of stone, oval in outline, 7 feet 7 inches long and 5 feet 7 inches in maximum width, had been placed over a skeleton lying on the base of a grave extending 15 inches into undisturbed, underlying clay. The skeleton, however, which was at full length on the back, was not in line with the major axis of the oval, but diagonal to it, the skull being toward the side of the greater end of the oval, the body extending down, the feet near the smaller end. It was impossible to determine the original depth of this grave, so much had been removed from the surface of the field by cul-

tivation. In addition to the 15 inches which the grave extended into undisturbed ground, there were 5 inches of midden soil above.

Mounds on Henry Island, Marshall County, Alabama.

Henry Island, owned by Mr. Bryant Henry, of Guntersville, Ala., is about three miles in length. About half-way up the island is a mound we did not visit, said to have a large, flat top on which are three buildings, and to be about 10 feet in height.

At the head of Henry Island, overlooking the water, has been a mound, presumably quadrangular with flat top, 10.5 feet in height. Apparently, however, more than two-thirds of this mound has been washed away. One diameter, the former length or breadth of the mound, is 100 feet.

At the foot of this remnant, in a cultivated field, itself having long been plowed over, is a mound, roughly circular, about one foot in height, with a diameter of 45 feet. This mound evidently had been plowed away to a considerable extent. There is a history of stone graves discovered in it.

Numerous trial-holes in this low mound resulted in the discovery of nine burials. The first seven burials, one of which was of an adolescent, lay five in flexed positions, two extended. None of these burials lay at a depth greater than slightly more than 4 feet. The skeleton of the adolescent, better preserved than were the other burials, was 3 feet from the surface.

One of the burials had a rude, undecorated pot with two loop-handles; another had, near the skull, a delicate, piercing implement of bone and the stem of an earthenware pipe. The presence of these two objects may have been adventitious, however.

Burial No. 8. Immediately below the surface was a stone grave 6 feet 8 inches by 3 feet, outside measurement. This grave, of the regular stone-box variety, was made of limestone slabs carefully arranged, the slabs having been set a number of inches into the ground below the base of the grave, which was neatly floored with slabs in contact, the small spaces between the larger ones having been filled with fragments of suitable size. A large, single slab was upright at the head, which was directed SE.; another, at the feet.

The covering stones had in part fallen in, as shown in our illustration (Fig. 50), the exposed space at the head of the grave (which is to the reader's right) being caused by the slipping of a slab which had dropped upon the thorax and skull, crushing the cranium, especially the facial parts. From the top of the highest slab to the upper surface of the bones was a distance of 1.5 foot.

Within the grave, whose inside measurements were 5 feet 10 inches by 2 feet 2 inches, and 1 foot 7 inches deep, measuring from the top of the highest slab, was the skeleton of an adult male, extended on the back (Fig. 51). Unfortunately, the slab at the foot of the grave has interfered with the view of the legs which, of course, were present.

Following the curve of the forehead, on which it rested, was an ornament

of sheet-copper which had been square or oblong. We could not determine if the curve imparted to the ornament had been intentional or was due to the slab which had fallen upon it, though owing to a certain regularity in the ap-

Fig. 50.—Burial No. 8. A stone box-grave 6 feet 8 inches by 3 feet, outside measurement. This places on record the presence of the stone box-grave in Alabama. Henry Island, Ala.

pearance of the curve, we believe it to have been purposely made to allow the ornament to follow the outline of the forehead and temporal parts of the skull.

Fig. 51.—Burial No. 8, the skeleton lying in the box-grave, shown after the removal of the covering slabs. Note the stone flooring. Henry Island, Ala.

The ornament, which bore a *repoussé* design, was of purely aboriginal make, having the material pieced together here and there with the aid of small rivets, a well-known procedure of early aboriginal artisans in sheet-copper.

The metal, unfortunately, had corroded away in places along the margin of the ornament and, in addition, went into fragments on removal, though the central parts by good fortune were less badly broken than were the outer ones, as it was centrally the principal decoration proved to be.

Fig. 52.—Decoration on the sheet-copper. Henry Island, Ala. (Full size.)

Most of the principal fragments have been put together with great care. and the interesting design they bear, a representation of the head of a man, so nearly as it can be made out after careful study, is faithfully shown in Fig. 52,

Burial No. 9, eight inches below the flooring of the stone grave, was the skeleton of a powerfully built male at full length on the back, entirely covered by the slabs above, except the skull which projected beyond the head of the superimposed grave.

The site on Henry Island is of special interest in that the stone grave found

there was a regular stone box-grave found in Alabama, a State from which no stone graves of any kind had been reported by others, hitherto.

The Roden Mounds, Marshall County, Alabama.

About 3.5 miles above Guntersville, but on the opposite side of the river, is the property of Mr. Benjamin Roden, who lives upon it, widely known as the Henry Bottom Place, it being mainly bottom-land bordering the river and having formerly belonged for many years to a family named Henry.

About one-quarter mile in a straight line NW. from the landing on this place, in sight from the river-bank, on the low slope of the first line of hills rising above the alluvial land were six mounds, within a few yards of one another but not in line, one somewhat elongated and resembling a ridge. These mounds had all been under cultivation except the two highest (A and B) which a causeway two or three yards in length connected though two others (C and D), we were informed, had been plowed over but a short period and at the time of our arrival at the place they were covered with small trees and underbrush. The remaining two mounds formed part of the field in which they were and regularly shared in its cultivation.

Mr. Roden, who lives on the property, informed us there was no history of the finding of aboriginal artifacts on the place, though masses of galena had been plowed from some of the mounds.

Investigation showed that the mounds were composed of rich, dark midden loam and of raw clay taken from the underlying soil, in places. Presumably the mounds were built when the site was covered with midden loam (which through wash, is not the case at present), and those carrying material took it, some from the surface, some from the underlying clay after having denuded the surface in spots. Thus, as a result, parts of a mound, as stated, were of one material, parts of another.

Individual "dumps" were not apparent as a rule, bands of workers presumably, as a general thing, having gone to one spot for material collectively and deposited it in the same way.

In all the Roden mounds, very generally the burials were mere traces of bones, sometimes only fragments of skulls.

Mound A.

This symmetrical mound, a blunt cone 50 feet in diameter of base, 9 feet 6 inches in height according to our measurement (the surface around it was very irregular, making exact figures impossible), but proving to be 10.5 feet from the summit to the base, first was investigated by us by the aid of a central excavation 14 feet square, to undisturbed, underlying soil, light in shade, and then was completely dug down.

Altogether sixty-four burials, some represented only by fragments and by

traces of bone, were encountered in the body of the mound, on its base, and in graves extending below the base, of which twelve were determined to have been of infants or of older children. All burials of interest, including each one accompanied by any artifact, will be described in detail.

Burial No. 1, a faint trace of bones 3 feet 8 inches down. With these was a celt of indurated shale, nearly 12.5 inches in length.

Burial No. 2, mere traces of bones at a depth of slightly more than 3 feet. With this burial lay a reel-shaped ornament of copper, about 6 inches square, outside measurement, that is to say from the tips of the arms. There are two perforations for attachment in the body of this ornament.

Burial No. 5. The remains of this burial consisted of what seemed to be traces of bones adhering to what was left of an ornament, probably a reel-shaped one, of thin sheet-copper, corroded through and through. Near this ornament was another reel-shaped ceremonial of thin sheet-copper, about 4 inches square, having two perforations, the ends of the arms slightly corroded away. A somewhat similar ornament, but of much heavier material, 4.5 inches square, having perforations, was thrown out by the digger from near where the others were found, and possibly came from the same burial, though in no other instance did we find a single interment so richly endowed. An arm from this ceremonial was missing from an early break, the edges of the fracture being carbonated. With the two copper ceremonials were twenty masses of galena, the largest about the size of a child's fist.

In no mounds explored by us before has galena (lead sulphide) figured to anything like the same extent. Some of the masses showed facets, while others had rounded surfaces indicating that the deposit which, as stated, is the carbonate of lead, the white lead of commerce, had been ground off for use as paint.

Burial No. 6. This burial, of an adolescent, 6 feet 3 inches down, was represented by fragments of bone of some size distinctly traceable and in much better condition than were most of the bones in this mound, except those from the base, where presumably moisture had not reached them. In this burial a skeleton extended on the back was clearly indicated. Transversely on the pelvis lay a copper celt 7.25 inches in length and 3.25 inches across the blade. Nearby lay the remains of a conchshell (*Busycon*) from the Gulf.

Burial No. 8. Small fragments of bone badly decayed but indicating the burial of an adult extended on the back, determined by the relation of the remains of the teeth to the other traces of the skull, lying at a depth of 6 feet 10 inches. Where the thorax had been were fifty-one small beads, short, tubular, of thick sheet-copper, the cord still in place in some of them.

Burial No. 9, extended on the back, was at a depth of 8 feet and had with it a fragment of shell and a small mass of almost pure carbonate of lime of the kind we shall see had been used at the site near the Cox mound, to be described in this report.

Burial No. 10, a skeleton at full length on the back, 10.5 feet from the surface, in a grave whose beginning was not noted,[1] 7.5 feet long by 22 inches wide, extending 8 inches into undisturbed soil below the base of the mound.

Around and above the skeleton yellow sand to a maximum depth of 3 inches had been placed, the sand totally differing from the soil surrounding it.

In a pile, arranged one above the other, were four bracelets of copper, each weighing about five ounces and approximately 3 inches by 3.75 inches, made by hammering the metal over on itself to form a bar, the extremities of which were bent together, bringing them almost in contact. This pile of bracelets was in part covered by a side of the skull which rested upon them. Back of the cranium, as if having formed part of a head-dress, were a number of well-preserved, small, shell beads, some discoidal, some barrel-shaped.

Burial No. 11. In making the grave for Burial No. 10 the bones of a child had been disturbed and scattered, a humerus of the child lying near the skull of the adult burial. Other bones were near the pelvis, while the lower jaw of the child was at the right knee of the later burial.

Burial No. 12. This burial lay in part below Burial No. 10, which, however, it had not disturbed and hence had been interred prior to Burial No. 10.

A skeleton fairly well preserved lay at full length on the back, in a grave 7 feet 8 inches long by 2 feet 4 inches wide. The depth of the grave from the surfaces was 12 feet, the two lower feet extending into undisturbed clay beneath the mound. The grave was filled with dark, midden debris and was easily distinguishable as to that part which was surrounded by the light subsoil. On the pelvis was a reel-shaped ceremonial ornament of copper (Plate VI, Fig. 1), without perforations, 6.8 inches by 6.1 inches over all, the arms of the ornament transverse to the line of the skeleton.

Burial No. 13, a child's skeleton, considerably decayed, lay in a grave 10 feet from the surface, extending 10 inches into the light-colored clay beneath the mound. This grave had been filled with the clay dug out in preparing it, and consequently presented no contrast to the clay surrounding it, and probably would not have been discovered had not the grave been somewhat softer than the surrounding material. We have often noted that graves in undisturbed soil, when filled, though probably a long time has elapsed, failed to pack to the same consistency that the ground around them possesses.

Burials Nos. 14 and 15, one of a child, the other of a young child or an infant, both in graves extending below the base under conditions similar to those described in connection with Burial No. 13.

Burials Nos. 10 to 15, inclusive, were all within a few feet of the center of the base of the mound. All burials heretofore described were reached by the

[1] No grave of this place except that of Burial No. 47, a superficial one, was determined as to its starting point in the mound, owing to prevailing conditions, though it is very probable that all the graves in it dated from the period of its beginning or from an early stage in its building, as the very dark material with which most of the graves were filled was not noted extending up into the mounds for any considerable distance.

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1 AND 2. RODEN MOUNDS, MOUND A, REEL-SHAPED ORNAMENTS OF COPPER. (FULL SIZE)

preliminary excavation. All described from now on were encountered while the mound was in process of demolition from the circumference of the base inward to the central excavation, a fact which should be borne in mind in connection with the depths of burials recorded.

No burial was encountered until digging had proceeded some distance inward. Near the margin of the base, however, a curious pit was found. This pit was clearly defined, extending 3 feet 5 inches into undisturbed, yellow clay. The length of the pit, 5 feet 10 inches, would have been suitable for a grave, but the width was only 10 inches. No bones or artifacts were present in this unusual excavation, though very careful search was made.

Burial No. 17, 6 feet 4 inches down, under the slope, consisted of fragments of skull and traces of femora lying on the base of the mound. Where a shoulder would have been, had it not in all probability decayed away, was a mass of galena.

Burial No. 21. In a grave extending below the base and traceable up into the mound, were remains of a skeleton having a few discoidal beads of shell, much decayed, at the neck.

Burial No. 22, the remains of the skeleton of a child, in a grave 3 feet 9 inches by 1 foot 4 inches and extending 1 foot into undisturbed soil below the base of the mound, which here was 6.5 feet from the surface. At the neck were a few decaying, discoidal beads of shell, and at the right thigh, sixteen small masses of galena.

Burial No. 23, a grave extending below the base of the mound, holding traces of a skull and femora. Near the bones was a mass of galena, weighing more than ten pounds, the largest found at this place by us.

Burial No. 26, a grave extending 1.5 foot below the base, containing the remains of a skeleton having near the head twenty-four small bits of galena.

Burial No. 35, fragments of a skull, having the remains of a femur immediately beneath it, and some fragments of a large marine shell.

Burial No. 40, the remains of the skeleton of a child, in a grave below the base. Nearby, in fragments, was a large marine shell (*Cassis tuberosa*) which, perhaps, had been a drinking-cup, and thirteen small masses of galena.

Burial No. 41, 7.5 feet down, shown by fragments to have been extended on the back. At the head and at the feet was a mass of pure clay.

Burial No. 44. Well in the body of the mound were the remains of a skull, near which were fragments of a large, marine univalve and five shells, some much decayed, which had been pierced for stringing, like beads.

Now the members of our expedition, from long experience, are familiar with the small, marine shells (*Marginella* and *Olivella*, and the larger *Oliva* shell) often used, when pierced, by the aborigines, in place of beads, but in the case of these shells with the skull it was evident we had to do with a kind we had never seen in the mounds before.

The shells were carefully labeled by the present writer, and after our return to the north were shown to Dr. H. A. Pilsbry, at our Academy of Natural Sciences

who at once pronounced them to be *Cypræa moneta,* or the cowry shell of Africa and the East.

As the discovery of these shells had never before, we believe, been recorded as having been found in an aboriginal mound or grave in the United States (we have made but few inquiries as to the records of other regions), and as our most careful investigation of the Roden mounds indicated that these had been built before their makers had any intercourse with white persons, except for the presence of these cowries, their discovery became an interesting matter and they were sent to Dr. W. H. Dall, at the United States National Museum.

We quote by permission a letter from Doctor Dall on the subject:

"I should incline to the belief that the cowries were imported in or about the time of Columbus' voyages. Bound, as they supposed, for the Indies, where the cowry was formerly (like our wampum) a staple article of barter, the exploring vessels would undoubtedly have carried cowries as well as the other articles of trade we know they carried. It would not have taken them long to find out that cowries did not pass as currency with American natives and reporting this on their return to Spain later traders would not have carried them for barter. The necklace or bracelet you obtained may have passed from hand to hand as a curiosity (as I have known such things to do) until it reached a people who knew nothing of the whites 'till much later. In fact your cowries may have come off one of Columbus' own vessels!"

From Mr. Charles C. Willoughby we have the information that in the Peabody Museum, Cambridge, Mass., is a dress of a Cree woman, collected by the Lewis and Clark expedition in 1804–1805. On this dress are four dozen cowry shells, perforated. Mr. Willoughby has described the dress and figured it,[1] but the cowry shells in question are on the side of the dress not shown in the photograph and take the place of the upper row of brass buttons on the dress.

The shells found by us differ from those on the Cree dress, which are of a larger variety and much more distinctly humped than are our shells, ours being of the variety *atava* as described by Rochebrune,[2] who says they come from the Cape Verde Islands. It must be borne in mind, however, that in our present state of knowledge as to the cowry shell, *Cypræa moneta* of Africa and the East, one cannot give exact distribution as to special forms. Hence neither our shells nor those on the Cree dress can now be proved to have come from the same or from different regions.

Mr. Willoughby believes that cowry shells were sold to the Indians by the Hudson's Bay Company late in the eighteenth or early in the nineteenth century.

Our attention has been called by Mr. W. J. Wintemberg to a paper by Prof. Henry Montgomery[3] wherein is noted the superficial discovery of a cowry shell

[1] "American Anthropologist," 1905.

[2] Bulletins de la Société Malacologique de France, Vol. I, 1884, p. 83, plate 1, fig. 4.

[3] "Recent Archæological Investigations in Ontario," Transactions of the Canadian Institute, Toronto, 1910, Vol. IX, Part I, No. 20, p. 7, Fig. 6, Pl. IV.

near the so-called Onatonabee Serpent Mound, Peterboro County, Ontario. The shell described by Professor Montgomery is a regular *Cypræa moneta*, or money cowry of Africa and the East, and not a California shell. This shell, which, by the way, is not pierced for stringing, is probably one from the Hudson's Bay Company stock. We do not think the sale of cowries to Indians in the North at a comparatively late date by the Hudson's Bay Company indicates a relatively recent origin for the Roden mounds, for, at a period when the supplies of the Hudson's Bay Company could have reached the makers of the Roden mounds, articles of European make could have got among them from all directions and the mounds presumably would have been well supplied with glass beads, brass, iron, and other things obtained from European sources which, as we see, was very far from being the case.

Burial No. 47, the skeleton of a child, comparatively well-preserved, having with it an oblong section of looking-glass, glass beads, a few beads made from marine shells, a small discoidal stone, an undecorated shell gorget about 3 inches in diameter.

As this burial, having some objects obtained from Europeans, was but 1 foot 8 inches from the surface of the mound, we consider it intrusive and by no means fixing the period when all other burials in the mound were made. No other burials were in graves except those beneath the base of the mound, while the shallow grave containing this comparatively modern burial was clearly traceable from the surface.

Burial No. 51. This grave was dug into before its nature was determined, it having been filled with clay removed from below the base when the grave was dug, and contrary to the usual custom this material had been used to fill the grave rather than the dark midden soil of which the lower part of the mound largely was composed. Near fragments of skull was a reel-shaped ornament of sheet-copper, about 5 inches square, which in part lay over a copper celt, 5.4 inches in length and 1.9 inch across the cutting edge.

This grave was within a very short distance from where our original excavation ended, as were all other burials in this mound detailed from now on. Had our excavation been made slightly larger, we would have found everything of interest present in the mound, though it took us forty-six hours' steady digging with eight trained men to find this out.

Burial No. 52. Extending below the base of the mound was a small grave which evidently had been that of a child, though all trace of bone had disappeared. The grave was filled with very dark midden soil including small fragments of pottery. Cutting into this grave, but not going through it, was another grave containing the remains of a skeleton at full length on the back, at whose right thigh was a large marine shell (*Cassis tuberosa*) in fragments, which may have been a drinking-cup, though not enough of the shell remained to determine the fact.

Burial No. 53, traces of a skull on the base and nearby a small mass of what

proved to be almost pure carbonate of lime. In the site on Mason Island, already described in this report, we have seen that this material was put to practical use.

Burial No. 58, represented by crumbling crowns of teeth, so far as the skull was concerned, though traces of thigh-bones were discovered in place, near which were sixteen small masses of galena. Near the teeth was a copper celt 3.2 inches in length and 1.3 inch across the cutting edge, two masses of galena, and fragments of an undecorated vessel of earthenware. This burial lay in the body of the mound 4 feet from the surface.

Burial No. 59. On the base lay fragments of a skull having nearby fifty-one beads of copper (as in another deposit), each about .3 inch in transverse section and .2 inch in height.

Burial No. 61. In the body of the mound were some particles of bone apparently preserved by the proximity of a copper celt 3.6 inches long and 1.7 inch in maximum width.

Burial No. 62, some fragments of bones lying almost immediately under Burial No. 61 and having in association a reel-shaped ornament of heavy sheet-copper, 5.5 inches by 5.2 inches, having two perforations. This ornament, which neither pick nor spade had approached, the earth near it having been removed with a trowel, had received about the center a furious blow, possibly the impact of an arrow or the thrust of a spear, and had been so nearly broken thereby that the two parts of it had divided when corrosion had set in, though they lay in complete contact in the ground. The blow, of course, may have been a ceremonial one, but separation had not taken place previous to interment.

Burial No. 64, fragments of bones in the body of the mound, accompanied by a celt of indurated shale, 10.75 inches in length, asymmetrical, and having various superficial depressions which a careful workman would have ground away.

In the mound were encountered, in addition to that of the infant of which mention has been made, several empty graves, as follows, from which, beyond question, the bones of former occupants had disappeared through decay: a grave 7 feet long by about 2 feet in width, extending 1 foot 9 inches into undisturbed clay beneath the base, contained nothing beyond a mass of galena 2.5 inches by 2 inches by 1.5 inch, flat on two opposite sides, the circumference artificially rounded, and part of an arrowhead of flint; a small grave evidently intended for a child contained, when found, only a few small masses of galena; another small grave extending beneath the base, as did the others, held neither artifact nor trace of bone.

In the body of the mound had been a burial resembling Burial No. 10 in this mound, in that a skeleton evidently had been interred in sand and entirely differing from the material making up the mound. In this sand, in which no bones were found, were seventeen masses of galena and a reel-shaped ornament of thick, sheet-copper (Plate VI, Fig. 2), 3.1 inches by 2.8 inches, having two perforations.

Found in the soil apart from bones, though probably in some instances marking the presence of former burials, were: ten arrowheads or knives, of flint, found separately; a considerable number of masses of galena, separate as a rule, though sixteen were found together; a small, rude chisel of indurated shale.

Mound B.

The story of Mound B is soon told.

This mound, practically contiguous to Mound A, was 48 feet in diameter; its height from the outside, where, as in the case of Mound A, the surface was irregular, was 7 feet 9 inches. Inside measurement from the summit to the base, which was marked by undisturbed, yellow clay, proved the altitude to be 9 feet.

An excavation 16 feet by 20 feet, put down centrally to the base, came upon eighteen burials, traces and small fragments of bones, such as were encountered by us in the body of Mound A, four of the burials being in graves extending into the soil below the base of the mound. In addition, a grave like the rest had lost its burial through decay.

Artifacts with the burials were as follows:

Burial No. 1, a mere trace of bones 2 feet 8 inches down, had two small masses of galena and a few, small, tubular beads of sheet-copper much corroded.

Burial No. 2, a faint trace of bones and the crown of a tooth. With these were a number of masses of galena not in a deposit but short distances apart, and several tubular beads of sheet-copper. This burial lay 2 feet 10 inches below the surface, and, like Burial No. 1, presumably had been much deeper, the peak of the mound having worn away.

Burial No. 13, six feet deep and represented by fragments of a skull, the remainder of the burial presumably having decayed away. Near where a forearm would have been was a celt of indurated shale, 9.5 inches in length.

Burial No. 14, a skull in fragments, 9 feet down, with which was a rude sphere of galena about 2 inches in diameter.

Burial No. 16, a grave 5.5 feet in length by 20 inches in width and 7 feet 8 inches below the surface of the mound, the lower 10 inches extending into undisturbed clay. On the bottom of this grave had lain a skeleton of which only fragments of the skull remained. Transversely under the skull was a celt of indurated shale (a material which seemed to predominate in this region), more than 10 inches in length, very rudely made, having rough depressions on both sides, giving the implement an unfinished appearance, though a part chipped from the cutting edge showed it to have been considered fit for use.

Scattered throughout the mound were various masses of galena apart from burials. Together, but with no bones in association, though no doubt a burial had been present, were a few small, tubular beads of sheet-copper, badly corroded, and four masses of galena. Two arrowheads or knives of flint were found separately in the soil, as was a small and very rude celt and, at a depth of 7 feet, a strip of thick sheet-copper, twisted and curved in an irregular fashion.

Mound C.

Mound C, 7 feet 6 inches in height measured from the outside, though from the top to undisturbed clay at the center of the base it proved to be 6 feet 9 inches, and with diameters of base of 43 feet and 73 feet, had its central part to the extent of 12 feet square dug out by us to the base.

Traces of seven burials were encountered, none at a depth less than 5 feet 2 inches.

Three graves, each about 20 inches in width and ranging between 6 feet and 6 feet 9 inches in length were found, extending below the base to depths between 1 foot and 1.5 foot approximately, one grave being nearly central in it.

In these graves were small fragments and faint traces of bones, in one instance indicating that a burial had been extended, as was probably the case with the other two. The burial in question, if our belief as to its position is correct, had a mass of galena at the pelvis and two others at the right of the skull.

Here and there in the mound, apart from burials, were found: fragments of an ornament of sheet-copper; three separate masses of galena; thirteen small masses of lead sulphide in a deposit, the largest about 2 inches in diameter, of irregular shape.

Mound D.

This mound, 5 feet in height and 38 feet in diameter of its circular base, was surrounded and completely dug down by us, the work being carried on at a level below that of the base, which proved to be 5 feet 7 inches below the summit of the mound.

No burial was encountered until a point 12 feet from the center had been reached. The burials found, thirteen in number, ranging in depth between 2 feet 8 inches and 6 feet 10 inches, were so badly decayed that small fragments and mere traces only were observable. It is probable, so minute were some of the parts representing skeletons, that burials escaped our notice, though with these presumably no imperishable artifacts can have been.

In two instances burials were found where it was evident skeletons had not been interred in anatomical order. In one case remains of a thigh-bone lay near fragments of a skull. In another were foot-bones beside the remains of a cranium.

Several burials were on or near the base, two being in shallow graves below it, one of which we shall particularly describe.

Burial No. 13, radiating from the center of the base of the mound, the head end directed from it, was very distinctly marked, the black material filling the grave contrasting with the bright underlying clay into which the grave had been dug to a depth of 1 foot 3 inches. Its shape was oblong; its length, 6 feet 9 inches; its width, 23 inches. In the grave were found a skull in small fragments, teeth, a trace of bone here and there.

With one burial, 32 inches deep, were fourteen masses of galena covered with a coating of lead carbonate (white lead, a paint), as was most of the galena from

these mounds. Eight of these masses, the largest of which was 2.5 inches by 2 inches by 1.5 inch, were somewhat scattered; the rest were in a group.

With the same burial, probably, all together, were forty-eight small masses of galena and a reel-shaped ornament of sheet-copper having one of the arms corroded away.

With another burial was a similar object, the sheet-copper being considerably thicker. In this one two perforations are present, the other being without them. A third reel-shaped ornament of hammered copper, without perforations, differed somewhat in shape from the others; like them it lay near human remains. The measurements of these objects, respectively, are: 3.2 inches by 3.6 inches; 2.8 inches by 4.8 inches; 3.4 inches by 6.3 inches.

Away from human remains were: two masses of galena found separately; a spike-shaped arrowhead, another with concave base, both of flint; a celt of indurated shale, 11 inches long and 2.4 inches in maximum width, which lay 10 inches below the surface and may possibly have been placed with a burial, traces of which were not discovered.

Mound E.

Mound E, evidently much spread by cultivation and reduced in height, had diameters of 40 feet and 50 feet, its height being 5 feet. A measurement taken later from the summit to the base gave the same result.

A central excavation 20 feet square, which probably included most of the original mound, although burials were encountered to the very edge of the digging, was put down to the base.

Twenty burials, often merely indicated, or represented by parts of a skull, lay in the mound, on its base, and in a few instances in graves extending below the base.

A single mass of galena lay near each of two burials; in one instance a mass of pure clay had been interred near a skull.

Burial No. 2, of which only a skull remained, had near it on one side an asymmetrical celt of indurated shale, 12.75 inches in length, and on the other side a mass of pure clay.

Burial No. 6 had, near fragments of a skull and with traces of other bones, a rude discoidal of galena.

Burial No. 7, a child, the only one noted in the mound, had at the neck a number of tubular beads of sheet-copper, badly decayed; another burial had a few similar beads.

Burial No. 10, a grave 5 feet 10 inches from the surface, extending 1 foot below the base, 8 feet by 2 feet 10 inches in size, contained fragments of human bones indicating a burial at length. Near traces of the skull was a sheet of mica of irregular outline, about 5.5 inches by 5.75 inches, on which were two small masses of galena.

Burial No. 16, fragments of a skull only, having beside it a rude agricultural tool of shale, 9.5 inches in length and 4.1 inches in maximum width.

Several masses of galena were found separately in the mound apart from bones as were three arrowheads or knives of flint and a small and very rude celt of indurated shale, roughly chipped, without polish save at the cutting edge.

Lying diagonally in the mound with the extremity of one of its arms at a level with the surface, was a reel-shaped ornament of sheet-copper about 4 inches square, having two perforations. This ornament had been struck by a plow presumably, with a resultant bending of two of the arms.

In earth that had been thrown out was found an oblong bead of sheet-copper, 1.25 inch long, .5 inch in width, flat on two opposite sides. The bead had been shaped in the usual manner by overlapping the sheet-metal.

Mound F.

Mound F, seemingly three mounds or humps merged in part, had its maximum height and width, 4.5 feet and 65 feet, respectively, near the western extremity, whence it sloped downward, tapering considerably toward the eastern end. Its length was 170 feet. Cultivation had, no doubt, greatly changed its original proportions.

In the highest hump, centrally, an excavation 25 feet by 29 feet was put down and carried below the base, showing the mound to be about the height of its outside measurement.

Twelve burials, affected to almost the last stage of decay, were encountered, as follows:

Burial No. 1, the remains of a skull, 2 feet down.

Burial No. 2, a skull in the body of the mound at a depth of 2 feet, having, where the neck would have been, two undecorated discs of shell, one about 2.5 inches in diameter, the other somewhat smaller. These discs, which were badly decayed and in fragments, each had two perforations. There was also near this skull a mass of pure clay.

Burial No. 3, at the bottom of a grave 26 inches across and 40 inches in length, extending 16 inches into the undisturbed soil below the mound, was what decay had left of a sheet-copper, reel-shaped ornament, having two perforations. Below it, preserved by the copper salt, was a small fragment of a long-bone, all that remained of the skeleton which, judging from the size of the grave, had been that of a child.

Burial No. 4. At the bottom of a grave similar to so many found at this place, were traces of a skull. Above the skeleton had been a thin deposit of pure clay.

Burial No. 5, a grave apparently made by digging from the original surface of the site through 4 or 5 inches of midden deposit, which had been present at this part of it, to undisturbed clay. At the bottom of the grave a layer of pure, yellow sand, about .5 inch in depth, had been placed. On this the skeleton, if we may judge by the skull and faint traces of other bones indicating a skeleton at length, had been placed and over it had been deposited a layer of pure clay, varying in thickness between 1 and 3 inches.

Burial No. 6, a grave-pit 7 feet 2 inches deep, extending 26 inches into undisturbed soil, 3 feet broad by 11 feet in length, there being considerable space between where the skull had been and the head of the grave. This burial, represented by part of a femur, and then, at the proper distance, by teeth and other parts of the skull, at each side of which had been a spool-shaped ear ornament of sheet-copper, one of which had discolored the adjacent temporal bone, had, near the head, a rudely-rounded mass of galena about 3.5 inches in diameter. On the space where the thorax must have been were two reel-shaped ornaments of sheet-copper, both having two perforations, one of the ornaments being somewhat decayed as to two of its arms. One of these objects, which is intact, 3.9 inches by 4.5 inches, lay beside the other, that is, the two transversely as to the skeleton, having about one inch of space between them. One, however, had been placed with its two perforations in line with the burial, while the perforations of the other ornament were transverse to the longer axis of the interment. With these ornaments was matting preserved by the copper salt.

Immediately alongside Burial No. 6, and having no partition between, was a grave of the same length as that of Number 6, but 6 inches deeper and 1 foot 6 inches narrower. No human bones were present in this grave. In connection with these two graves were two excavations, seemingly post-holes, the exact use of which was not determined.

Burial No. 7, a grave below the base, in which were faint traces of bones, two masses of galena, and a lump of clay at one end.

Burial No. 8, a grave extending into undisturbed soil, containing a fragment of femur and a bit of humerus with which was part of a large conchshell, badly decayed.

Burial No. 9, a grave n which only crowns of teeth were found, having a large mass of galena, and a quantity of pure clay at one end.

Burial No. 10, fragments of a skull at a depth of 3 feet.

Burial No. 11, parts of a skull and fragments of other bones, 4.5 feet deep, on the base of the mound. Over this burial, which had been under a thin stratum of pure clay, was a mass of galena.

Burial No. 12, a grave in which was simply a fragment of bone lying beneath a layer of clay. A mass of galena was in this grave.

There was also in the mound a grave having pure clay at each end, but in which no bones were discovered.

A number of masses of galena were scattered through the mound, some carefully rounded. Also one arrowhead was found, and a celt of indurated shale, 8.5 inches in length, which, no doubt, belonged to a burial that had left no trace.

There was also present in the mound a mass of soft material about 2.5 inches by 1.5 inch by 1 inch, through which, for some purpose unknown to us, a hole had been made. This material has been determined by Doctor Keller to be

an earthy variety of anglesite or sulphate of lead, which could have been used as paint, gray-white in shade.

In the second hump of Mound F a hole 10 feet square was put down through the base this hump having almost the same height as the one already described, resulting in the discovery of three burials.

Burial No. 1, fragments of a skull 20 inches deep.

Burial No. 2, traces of a skull in a grave extending 8 inches into undisturbed soil.

Burial No. 3, a grave having at one end a mass of pure clay, but containing only a fragment of long-bone.

There was also a grave 7.5 feet by 2 feet and 8 feet deep, 3 feet 8 inches of which extended into undisturbed clay below the base. Though a mass of clay was in this grave, no bones were discovered.

In the smallest hump an excavation 10 feet square came upon four burials.

Burial No. 1, a skull in the body of the mound accompanied by clay.

Burial No. 2, a grave, the base of which was 44 inches from the surface, containing only remains of a skull, near which was a mass of pure clay. Where the pelvis doubtless had been was a celt of copper 3.5 inches in length and 1.5 inch across the cutting edge. In the soil filling the grave, which was 2 feet 9 inches wide by 8 feet 8 inches long, was a mass of galena.

Burial No. 3, a grave 4 feet deep containing two skulls, one just above the other, the lower accompanied by a mass of clay, the other having a fine spearhead of flint, 6.4 inches in length. This spearhead apparently had been broken in two parts ceremonially, the fragments lying a considerable distance apart. The grave, smaller than many in the mound, was 2 feet 3 inches wide by 7 feet in length. It extended 1 foot 2 inches into undisturbed soil.

Burial No. 4, a grave containing a faint trace of bones, and a mass of clay at each end.

Mound and Dwelling-site on Pine Island, Marshall County, Alabama.

This island, about four miles long, locally well known as a place where aboriginal bones and artifacts have been plowed up, is owned by Mr. J. C. Gunter, of Bridgeport, Ala.

At the very upper end of the island (save a small area washed in flood-time until its level is far below that of the rest of the land) is the remainder of what has been a mound of considerable size, of which probably not one-third remains, three sides and much of the body having washed away. What is left of the mound has a height of about 8 feet above the general level, though one taking the altitude from the low-lying ground at the extreme upper end of the island, which is immediately at the farther side of the mound, would of course obtain a height far in excess of that we have given. It was impossible to arrive at any estimate of the original diameters of the mound. No digging was attempted

in this remnant, as it served as a kind of bulwark to stay the rush of water in times of freshets, and as the mound probably had been of the domiciliary class it is unlikely much would have been gained from digging it, even had it been intact.

Beginning immediately at the lower, or down-river, side of the mound, is a great, level space about one-half mile in length, broadening as the island expands from its pointed extremity, and having over the surface, here and there, fragments of flint or of coarse, shell-tempered pottery. Judging from its appearance, all this area has been an aboriginal dwelling-site presumably containing scattered burials which doubtless were more condensed in several low rises and ridges, none probably more than one foot in height, to be seen at intervals over the field.

Unfortunately, all this site was planted in grass, though we obtained the privilege to dig through two spaces in it, one 50 feet by 60 feet enclosing a small rise, and another 50 feet square which included part of a ridge, both being but a short distance from the mound.

In the rise were eighteen burials,[1] of which thirteen were of adults, one of an adolescent, and five of infants or of older children. Of the adult burials eleven were of the flexed variety, one was extended on the back, one was a disturbance. The adolescent lay at full length on the back.

These burials were grouped toward the center of the rise and lay from near the surface to a depth of nearly 6 feet, this latter measurement being of a grave extending 8 inches into undisturbed sand. In other parts of the rise, however, made-ground, which in places had at its base 4 or 5 inches of broken musselshells and loamy sand, of which latter material the made-ground was mainly composed, had a depth of more than 6 feet.

It seemed to us, however, that the deposit in this place was not entirely due to aboriginal occupancy, as thin layers were present in the lower part of it which, being of pure sand, might have been deposited by the river in high water, while that part of the site, though occupied, was lower than it is at present. However, we could not definitely determine this matter.

The burials in the rise apparently had been made in shallow graves at various periods in the growth of the site, as above some of these graves was undisturbed soil of considerable depth.

We shall now describe each burial from the rise that presented any feature of interest, including all with which artifacts were found.

Burial No. 1, partly flexed to the right, having at the head a fairly symmetrical bottle with wide mouth, undecorated and of inferior ware.

Burial No. 4, at full length on the back, the arms and forearms alongside the trunk. Crossing the right forearm, the cutting edge inward, was a beautiful ceremonial axe of indurated shale, 6.9 inches in length, having a countersunk

[1] Burial No. 5 included a child and an infant.

perforation as shown in Fig. 53. At the left of the skull was a mass of red pigment, hematite, and various small fragments of mica were on the thorax and left shoulder.

Burial No. 5. At the bottom of a pit, 5 feet 9 inches from the surface, was an arrangement of slabs and masses of rock, limestone, sandstone, quartzite, in double thickness in some instances, rudely oblong but tapering somewhat at one end. This aggregation of slabs and masses was 34 inches in length, 14 inches and 9 inches across the ends, respectively; its depth from the surface was 3 feet 10 inches.

Fig. 53.—Ceremonial axe. With Burial No. 4. Pine Island, Ala. (Full size.)

Lying transversely at the wider end was the skeleton of an infant, and, in addition, with its feet toward the back of the first burial and in part under the same arrangement of stones, which was without interval and undoubtedly made at the same time, was the skeleton of an older child, closely flexed, its lower extremities and the lower part of the trunk covered by the stones, the remainder of the bones extending out from one side of the arrangement of stones, though a space 16 inches in length under one end of the arrangement was unoccupied, as shown in Fig. 54. Evidently the burials had been placed in the bottom of the pit and perhaps covered with a few inches of earth, and presumably the arrangement of the stones, though well-intended, had not followed the position of one of the bodies.

Burial No. 9, a skeleton closely flexed on the left side, lying slightly in a

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1. SITE ON PINE ISLAND, CEREMONIAL AXE. (FULL SIZE)
2. MOUND ON THE BISS PLACE, CEREMONIAL AXE. (FULL SIZE)

diagonal position, the head higher than the pelvis. Inverted over the skull, the upper part of the thorax, and the proximal end of the humerus, was a fragment representing more than one-half of a rude, undecorated bowl that had been 14 inches in diameter.

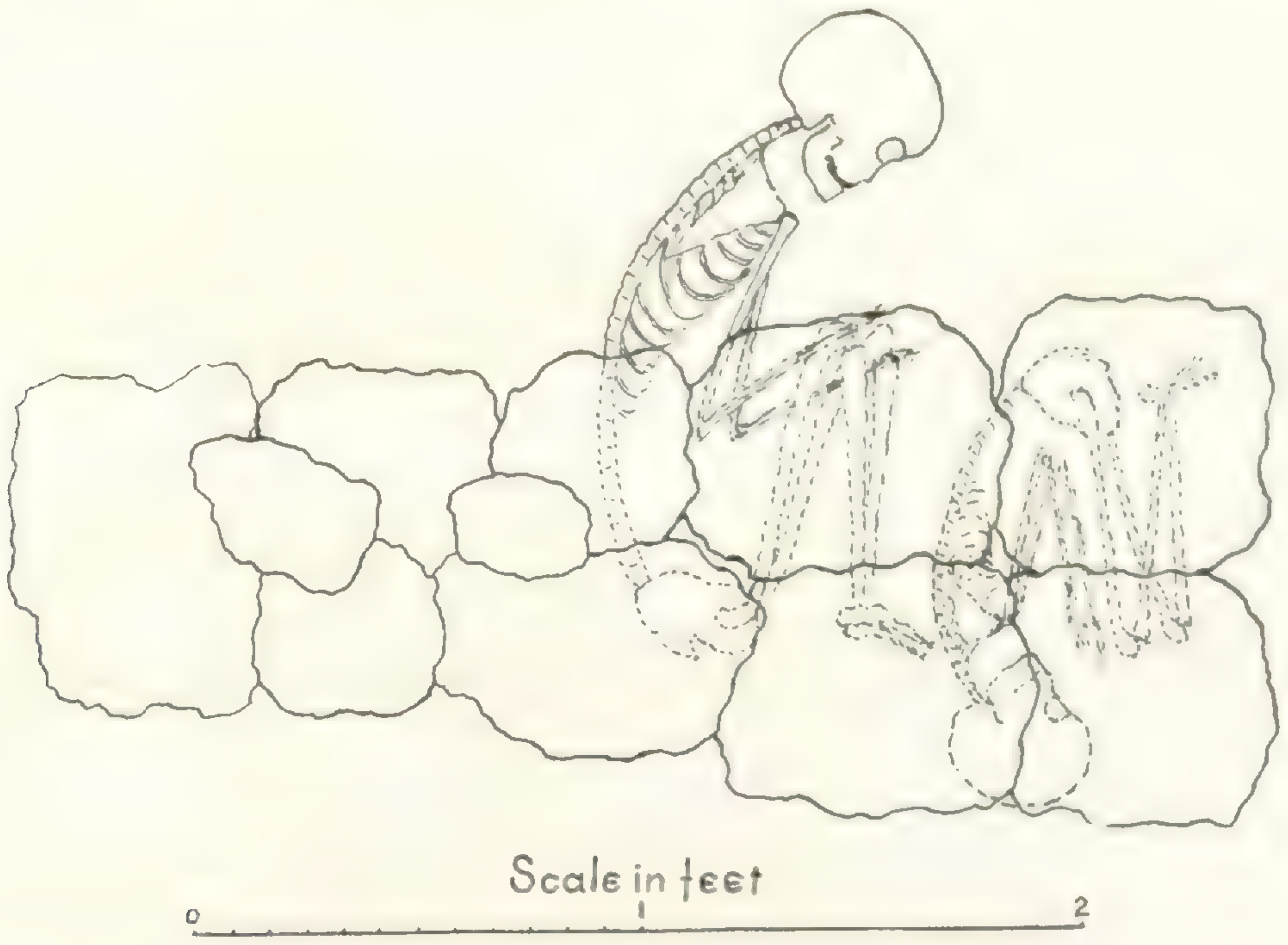

FIG. 54.—Burial No. 5. The slabs and skeletons lie in a horizontal plane. Pine Island, Ala.

Here we observe a kind of urn-burial in Alabama,[1] a state noted for this class of interments.

Burial No. 10, closely flexed on the left side, a coarse bowl having rude knobs on the side, back of the skull, shell beads at the right and left wrists.

Burial No. 13, a young child having shell beads at the neck.

Burial No. 14, partly flexed to the right, having an undecorated bottle of coarse ware with discoidal base at the outer side of the knees. Vertical, near the skull, a flat side parallel to the cranium, was a ceremonial axe of indurated shale, 7.6 inches in length (Plate VII, Fig. 1).

At the outer side of the right forearm and parallel to it was a deposit. First were two celts, one upon the other, the cutting edges directed toward the hand. Next in order outward was a narrow celt or chisel, beneath which were numerous fragments of chert. Below these again lay a small chisel. All these implements were of indurated shale. Next were five bone implements, in fragments, having nearby a mass of graphite about the size of an infant's hand. Under the implements and the graphite were additional fragments of chert. These fragments, fifty-seven in all, were none larger than 2 inches by 1 inch and from half to three-quarters of an inch in thickness.

Away from burials, in the soil, were: a fragment having belonged to a very large vessel and having attached to it a massive loop-handle; a small discoidal stone; a fragment of sheet-copper; a small cone of sheet-copper, formed by overlapping one edge above the other; a single glass bead.

[1] See our article "Urn-burial" in the "Handbook of American Indians."

In that part of the ridge investigated by us were twenty burials: nine of adults, one of an adolescent, ten of infants or of older children. Seven adults and one adolescent had been buried in forms of flexion. One adult lay extended on the back, while one rested at length as far as the knees, the legs being closely flexed against the thighs.

Burials Nos. 19, a child, and 28, adult, flexed, had each a shell ear-plug of the pin variety in place at either side of the head. In addition, the latter burial had under the chin a shell gorget 2.7 inches by 2.2 inches with excised spaces and an engraved design on the concave side representing a rattlesnake (Fig. 55),

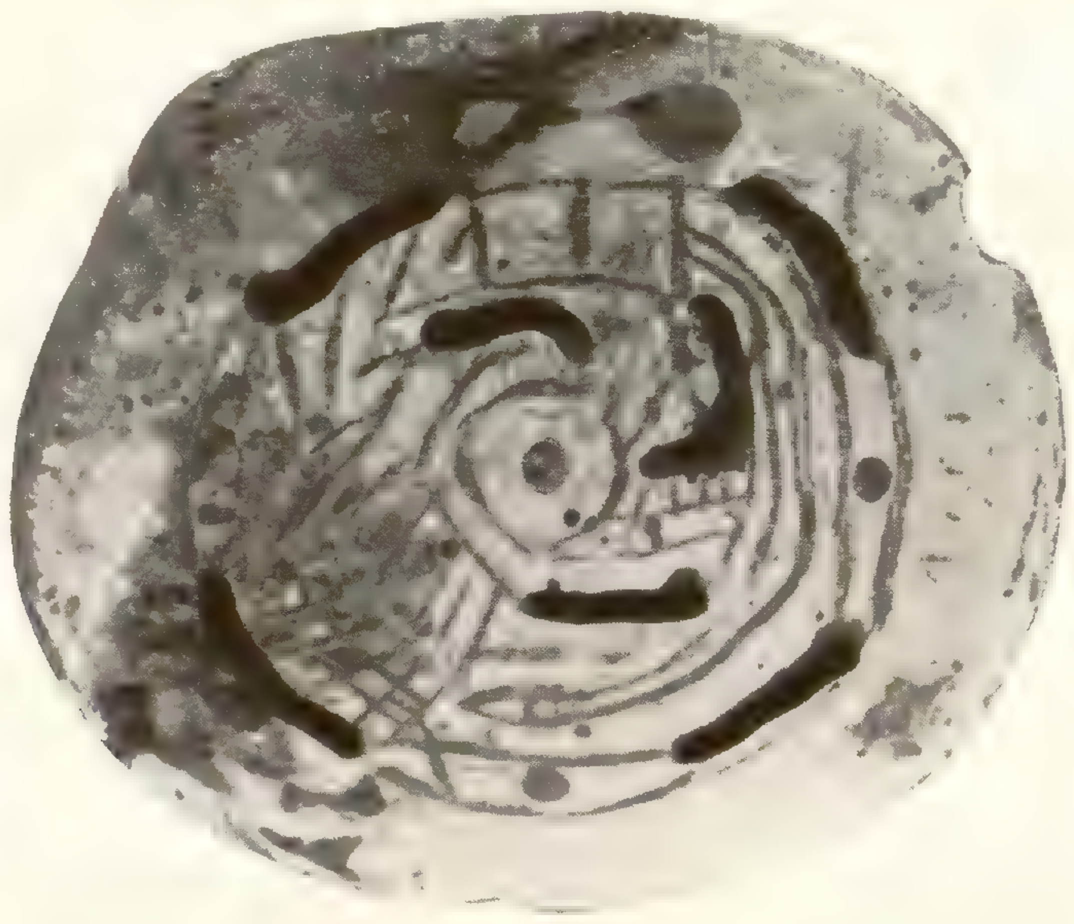

FIG. 55.—Shell gorget, rattlesnake design. With Burial No. 28. Pine Island, Ala. (About full size.)

not the conventional serpent such as we sometimes see on gorgets from Tennessee, but an attempt to portray the snake, similar to some we have found and to those shown by Holmes in Plates LXII and LXV of his "Art in Shell." The specimen found at this place, however, is the rudest attempt of the kind with which we are familiar.

Burial No. 20, flexed, had quantities of beads made from the marine shell *Marginella*, these particular shells seemingly having been selected, as their average size is unusually large. They are in excellent condition. Under the left shoulder was a celt of iron or of steel, 3.25 inches in length, and a tomahawk of the same material showing where the handle had been at the back, the blade expanding to a cutting edge.

Burial No. 22, a child extended on the back, had at one side of the skull a rude bowl with a small degree of incised decoration around the opening, and at the other side of the skull, a pot with two loop-handles, undecorated save for four knobs around the body. In this vessel was a musselshell (*Unio*). At one side of the head was an ear-ornament of the shell-pin kind, its companion lying broken under the skull. An undecorated bowl having two loop-handles rested on the thighs.

Burial No. 23, a child having at the neck twenty shell beads ranging in length

between .5 inch and 1.1 inch, the latter being sections of the columella of the conch. With these were two *Oliva* shells pierced for stringing.

Burial No. 26, a child near whose body had been placed an undecorated bowl. A spoon carved from a musselshell lay at the pelvis.

Burial No. 27, a child. At the skull was an undecorated pot, having had two loop-handles, one of which is missing.

Fig. 56.—Vessel of earthenware. With Burial No. 29. Pine Island, Ala. (Height 5.6 inches.)

Burial No. 29, flexed, had at the left shoulder a vessel bearing a small amount of incised decoration, shown in Fig. 56 as illustrating the best of the ware from this place. The skull of this skeleton was saved.

Burial No. 32, a child, having at the neck seven marine shells (*Oliva sayana*) pierced longitudinally for use as beads, and in front of the face an undecorated pot with one of two handles missing.

Burial No. 33, a child. At the neck were two shell beads of fair size, and at the head an undecorated vessel with two handles, containing a decaying musselshell that no doubt had served as a spoon.

Burial No. 38, a child about eight years of age, lying at a depth of 4 feet 4 inches. From the neck to the pelvis and at the knees were quantities of glass beads and a few of shell. Across the chest, in line, near other beads were four discs of shell, the largest 2.2 inches by 1.8 inch in diameter, each having a perforation on two opposite sides near the margin and showing where a cord had extended across the front. With these ornaments were two tubular beads of shell, each 2 inches in length. On each forearm was heavy iron wire twisted to form a

kind of bracelet. At the feet was a deposit of eight small, triangular arrowheads of flint, all pointing in the same direction.

Three feet from the surface, forming almost an oval 2 feet by 1 foot 2 inches, had been arranged a slab of quartzite about half covering one of limestone. Below these slabs no burial was found.

Objects apart from burials were: a rude, undecorated pot near a fireplace; several small knives of flint; a small drill of the same material; a diminutive boss of impure sheet-silver, centrally perforated; an undecorated bowl about 6 inches in diameter, inverted; a barrel 50 inches in length, having belonged to a flint-lock firearm. This barrel had a smooth bore and was of iron, not of steel. No remnant of the stock remained, nor was the lock present, and it is possible that the barrel, which was only 1.5 foot below the surface, may not have formed part of the aboriginal deposit. The jaw of a black bear came from midden debris at this site.

Dwelling-sites near Garland's Ferry, Jackson County, Alabama.

On property belonging to Mrs. Hattie Garland, of Scotsboro, Ala., are three small dwelling-sites in cultivated land, and two others, much smaller, which were not investigated.

A few yards from the river and about 50 yards SW. from where it is joined by a channel draining rain-water from the hills, is a circular patch covered with fragments of shell and having a small proportion of other midden debris. Its diameter is about 35 feet. On the surface lay four slabs which the tenant occupying the property informed us he had struck with a plow and, upon removing them, had uncovered a skeleton.

Twelve burials were found in this slight rise—ten of adults, two of children, one burial including two children. These burials were of the usual flexed varieties, including a number of disturbed bones, and as a rule lay on the original surface, having over them only about one foot of earth, though no doubt considerably more had covered them prior to the cultivation of the field. Several, however, lay in pits, one of which was 3 feet deep.

Burial No. 2, a child, closely flexed on the right, had a mass of stone which had been placed in the ground diagonally in a way to cover the pelvis and the lower extremities, which were drawn up, as of necessity in a closely-flexed burial. A smaller mass of stone was above the upper part of the skull, the lower portion of which, as well as the trunk, being unprotected.

A short distance from the skull was what may have been a ceremonial group of masses of stone, consisting of five in contact. Beneath them was a thin layer of clay, slightly reddened by heat but not baked, and a small amount of charcoal. No bones lay beneath this arrangement of stone.

Burial No. 3, the skeleton of a child in a shallow pit, the bottom of which was 26 inches from the surface. Covering the flexed body and extremities and part of the skull were two slabs a short distance apart, the space between them

being filled by the lower part of a mass of rock whose upper portion fitted in to form part of a second layer, there being a large mass on one side of it and two smaller ones, side by side, on the other. The four upper masses were 21 inches

Fig. 57.—Burial No. 9, a burial having arranged above it masses of rock, somewhat in the form of a horseshoe, 3 feet 2 inches long and 26 inches across the opening, over all. Garland's Ferry, Ala.

long, 1 foot in width at one end, 9 inches at the other extremity, the smaller one being over the skull, as more space was demanded for the trunk and flexed extremities. This upper layer completely covered the skeleton.

Burial No. 9. In a pit 22 inches deep was a skeleton closely flexed on the right, having at the wrist marine shells (*Olivella*) used as beads. The skeleton lay within an arrangement of masses and slabs of claystone, somewhat resembling a horseshoe, about 3 feet 2 inches long and 2.5 feet across the opening, outside measurement, as shown in Fig. 57. Of the skeleton there were exposed the lower half of the trunk, the lower extremities except the knees, and the upper extremities except proximal parts of the humeri, and the right forearm.

Fig. 58.—Burial No. 12. A placement of masses of rock, 4 feet 2 inches long and 2 feet 4 inches in maximum width, covering the skeletons of two children. Garland's Ferry, Ala.

When the large slab which formed part of the horseshoe had been removed, the entire skeleton was exposed and it was seen that it lay between four masses of rock on one side and one long mass on the other side, having behind it a smaller mass that did not contribute to the length of the side. Evidently, then, the bones had been placed in an enclosure open at both ends, the sides of which acted as supports for the large slab placed horizontally over the upper part of the skeleton.

Burial No. 12 was in a pit 2 feet 10 inches deep and included an arrangement

of masses of stone, 4 feet 2 inches in length; maximum width, at one end, 2 feet 4 inches; at the other end, 1 foot 9 inches. This arrangement (shown in Fig. 58) had its upper surface 1 foot 6 inches below the level of the site.

Lying transversely under the wider end was the skeleton of a child four or five years of age, closely flexed on the right side, covered by the largest pair of masses and the adjacent stone at the end.

At a slightly lower level than the other burial, which was somewhat above that of the bottom of the pit, was the skeleton of a child about 6 years of age, partly flexed on the right side and covered by the remainder of the masses of stone.

An interesting feature in connection with this burial is that five of the masses, all of sandstone, are water-worn boulders and all are more or less pitted, probably by the cracking of nuts, none having more than four pits on one side. Some of these masses also had concave surfaces caused by use as mortars.

One hundred and fifty yards W. from the other site, in the same field, was one of about equal size, having, however, much more shell in its soil. In this site were found seven burials: three of adults, two of adolescents, two of children. With the exception of an adult burial at full length face down, the adults and adolescents lay in ordinary forms of flexion.

Burial No. 14. The arrangement of this grave was symmetrical, consisting as it did of practically three sides of a square formed by masses of stone arranged side by side, having, however, a few small masses curving in a purposeless way, apparently, from one end of an open side.

This equilateral area, about 3 feet in diameter, without covering of any kind, contained a skeleton lying partly flexed to the left, the head, curiously enough, according to our ideas, being at the open end and projecting somewhat beyond it. Near the face was a mass of bright red pigment (hematite).

With the exception of a small space left open in one of the sides, the stones forming them were practically contiguous and included an interesting feature. The grave next to be described had been made previous to the one under description and had been reached in digging to prepare for Burial No. 14, whose makers had utilized that part of the grave discovered that could be made to fit into one of the sides of their enclosure.

Burial No. 15, an elongate pile of stones over the bones of a child.

Burial No. 17 lay flexed on the left side beneath 8 inches of the shell material composing the site. Above this lay two slabs, one over the lower part of the trunk, the other above the feet of the skeleton. The upper surface of the slabs was covered by 18 inches of shell material to the surface.

One hundred yards NE. by N. from the union of the watercourse with the river, but on the opposite side of it, still on property belonging to Mrs. Garland, was a site similar in appearance to the others and of about the same size, having upon it a pile of masses and slabs of stone, about 2.5 feet in height and 3 feet in diameter, which had been plowed up and piled in the cultivation of the field. In this site careful digging reached five flexed burials of adults.

Burial No. 19, partly flexed on the left, had a number of small masses of rock scattered here and there, in the soil above it.

Burial No. 20, partly flexed to the right.

Burial No. 21, closely flexed on the right, had upon it a slab from the feet to the upper part of the thorax, covering them in the main but not completely. At the outer side of the knees was a small slab on edge.

Burial No. 22, partly flexed on the left and covered, with the exception of the pelvis, with masses of stone of very irregular shapes, in single layer in places, double in others.

Burial No. 23, a skeleton lying closely flexed on the right with the exception that the dexter thigh was at a right angle to the body, the tibia closely flexed against it, had upon it an arrangement of masses and slabs of stone (some of the latter on edge), rudely elliptical in outline, as shown in Fig. 59, 3 feet 3 inches long and about 2 feet in maximum width. These slabs and masses, which were variously of sandstone, limestone, claystone, and silicious rock, had their upper parts 2 feet below the surface, the pit in which the burial lay being 3 feet 3 inches deep. These slabs, as may be seen in the illustration, did not completely cover the skeleton, the pelvis and part of the left thigh being exposed.

At this place, once in the second site described and twice in the last one, were found placements of stones and of slabs, having the appearance of graves, with which no sign of bones was discoverable.

One of these, 3.5 feet by about 3 feet, was a placement of masses and slabs of quartzite, of sandstone, of claystone, consisting of two large slabs on which were seven masses and slabs.

An extensive, irregular placement of masses and slabs, numerous but mostly small, lay a short distance below the surface.

Another in double layer in places, 8 feet 2 inches long and 2.5 feet at the middle, having one end 2 feet in diameter and one about 8 inches less, had precisely the appearance of the covering of a grave, but though the soil beneath was carefully spaded out to a considerable depth, nothing indicating the presence of a burial was encountered.

Apart from remains in these three sites were three arrowheads of flint, two with stems, one triangular, and a small chisel of indurated shale.

Mounds on the Snodgrass Place, Jackson County, Alabama.

Almost on the river-bank at the Snodgrass Place, which is owned by Mrs. Texas Snodgrass, of Scotsboro, Ala., are two mounds which have suffered through wash and wear, the smaller only a remnant, having dwellings upon it.

The larger, which has been quadrangular with a flat top, has a roadway upon it to afford access to a large frame structure covering much of its summit-plateau. The height of the mound is 19 feet; its basal diameters are 118 feet and 155 feet.

Though Mrs. Snodgrass most generously put these mounds at our disposal, we felt that investigation of them would be useless.

Fig. 59.—Burial No. 23. A placement of masses of stone, 3 feet 3 inches by 2 feet, over all, lying over a skeleton. Garland's Ferry, Ala.

Cox Mound and Dwelling-site, Jackson County, Alabama.

On the river-bank, in a large, cultivated field forming part of the estate of Mr. J. H. Cameron, who resides somewhat back on the slope of the nearby hills, is a mound about 13 feet in height, having a flat top, known as the Cox mound. Its diameters of base are 90 feet and 105 feet. The mound has upon it a frame structure used as a barn for Mr. Cameron's cattle, and for this reason and owing to its uninviting shape, no investigation of it was attempted.

The Cox mound stands upon a low ridge extending along the river-bank. On the eastern side of the mound, this ridge, which there is about 75 yards in width, has abundantly on the surface for a distance of about 250 yards, flint pebbles, broken and whole; chips of flint; fragments of musselshells; and, to a less extent, potsherds; broken agricultural tools of limestone; arrowheads and knives of flint, broken and whole, a few of the arrowheads being triangular, some having stems. The sherds were undecorated, bore incised, elementary designs, or had small checks or oblong impressions conferred with a stamp.

All that part of the ridge on which the debris lay was carefully tested with the aid of a steel rod and by numerous trial-holes. Made-ground extended in places to a depth of nearly 5 feet, though, as a rule, soil blackened by organic matter was not found at more than from 2 to 2.5 feet below the surface. Under this was brown sand containing shells, extending to undisturbed, underlying sand.

All this made-ground was found to be shallower beyond an area extending about 100 yards easterly from the mound, in which most of the burials proved to be, though widely-scattered ones were met throughout the whole eastern part of the ridge on which midden debris was apparent on the surface.

Burials were at all depths, some nearly 5 feet down, and evidently had been made in graves during successive periods of the accumulation of the made-ground above them.

The limits of the graves, in nearly every instance, were impossible to distinguish, as they had been filled with the material removed in the process of making them, and the made-ground of the site had not been deposited in layers.

Very few graves had been made in the upper dark material and continued into the brown sand and shells, otherwise, there would have been ample means to contrast the black soil with the brown sand, but seemed to have been dug almost exclusively either in the dark, midden material above, without going deeper, or in the sand and shell beneath it.

Above some of the burials at this place, at different depths from the surface, a layer of clay, reddened by heat, sometimes mingled with ashes and charcoal, had been placed. This red layer extended beyond the limits of such graves where it was found, and consequently seemed to have been on top of the grave and on the level of the site at the time the grave was made. The depth below the surface at which these layers were found by us can readily be explained by the growth of midden deposit after the period of the making of the grave.

This clay did not mark the site of fires made above the graves, but had been brought from elsewhere, as the clay and the ashes were sometimes mingled.

Thirty burials (fifteen adults, four adolescents, nine children, one disturbance, one large deposit of bones) were encountered east of the mound. We shall describe in detail all having artifacts in association, as well as burials having other features of interest.

Burial No. 1, a young child having at the right forearm twenty-six shells (*Oliva sayana*) pierced for use as beads. At the left of the head was an undecorated pot of about two quarts' capacity, alongside which was a small, undecorated

Fig. 60.—Gorget of shell. With Burial No. 4. Near the Cox mound, Ala. (About full size.)

one, evidently intended for a child, having over the opening, a large musselshell which fell to bits on removal. In connection with this burial was the reddened clay we have described, mingled with which were fragments of matting, suggesting the remains of a wigwam.

Burial No. 3, an infant lying immediately beneath a mass of stone completely covering the remains, no great space being required as the thigh-bone of the little skeleton was but 3.25 inches in length. At the neck were shell beads.

Burial No. 4, adolescent, partly flexed to the left, the trunk slanting diagonally up the side of the grave. At each ear was the columella of a conch having the upper whorls of the spire still upon it, which had been used as an ear-ornament by being thrust through the lobe of the ear. At the beak of one of them is a perforation.

Near the left humerus, where no doubt it had fallen from the chest, was a shell gorget (Fig. 60), the design engraved on the convex side, a somewhat

unusual feature. This design is of a well-known class described and figured by Putnam[1] and exhaustively treated by Holmes,[2] on which is represented a figure made up of lines symmetrically looped at the corners, which Holmes points out as similar in shape to one found in a Mexican codex. Enclosed in this interesting square often are crosses and sun-symbols. Invariably at each of the four sides of the square is the head of a bird, presumably the ivory-bill woodpecker, of which we have had considerable to say in connection with our work at Moundville,[3] Ala. The Canada Indians made coronets of these bills for their chiefs and paid two or even three deerskins for a single bill, not having the birds in their cold climate.

Shell beads, twenty-one in all, oblate-spheroidal, the largest having a diameter of .7 inch, lay with the gorget and at the right wrist.

Burial No. 6, the trunk on the back, the thighs diagonally upward to the left, the legs closely flexed on the thighs.

Burial No. 7, a deposit of bones the upper part of which, near the surface, may in part have been plowed away. Twelve skulls, one of which was saved, were recovered from it, and seventeen pairs of femora, having belonged to fourteen adults, one adolescent, two children. With this deposit were *Marginella* shells used as beads, many of which were within a skull.

Burial No. 9, at a depth of 3 feet to the upper surface, in contact, lay two masses of ferruginous sandstone, each about 5 inches thick, covering a space 28 inches by 16 inches, on which lay the bones of a young infant having pierced *Marginella* shells at the neck and thorax.

Burial No. 12, the trunk in a semi-reclining position, the head uppermost, bent over and resting against the knees, the thighs being vertical and having the legs closely flexed against them. The right humerus was alongside the body, the forearm at a right angle to it, at the side of the pelvis; the left humerus lay downward along the thorax, the forearm partly flexed and crossing the pelvis.

Burial No. 14, partly flexed on the right, having shell beads at the upper part of the thorax.

Burial No. 17, reclining against the side of the pit, the thighs closely flexed on the trunk, the legs against the thighs, the right arm and forearm along the trunk, the left arm along the thorax, the forearm closely flexed on it.

Burial No. 18, partly flexed to the left, having shell beads from below the knees to the ankles.

Burial No. 19, the trunk lying on the back, the thighs flexed diagonally upward to the left, the legs closely flexed on them; the humeri alongside the body, the forearms slightly flexed, bringing the hands on the pelvis.

Burial No. 20, a child having marine shells (*Olivella*), used as beads and mingled with other shell beads at the neck.

[1] Eleventh Ann. Rep. Peabody Museum, p. 308 *et seq.*

[2] "Art in Shell of the Ancient Americans," p. 280 *et seq.*, Plates LVIII, LIX.

[3] "Certain Aboriginal Remains of the Black Warrior River," Journ. Acad. Nat. Sci. Phila., Vol. XIII, p. 138 *et seq.*, *et al.*

Burial No. 21, a child having shell beads at the neck.

Burial No. 27, partly flexed to the left, small shell beads at each wrist, also on the pelvis where, in addition, was a discoidal bead of indurated shale, 1.4 inch in diameter and .6 inch in thickness, having a central perforation; small beads also were near the knees.

Burial No. 28, adolescent, part of the skeleton showing disturbance, though no cause was apparent. At the right elbow were four vessels of very coarse, shell-tempered ware; a small, undecorated one within a pot having no decoration; an undecorated bowl and a bottle having rudely incised around the body a current scroll entwining a series of knobs.

Fig. 61.—Bowl of earthenware. Near the Cox Mound, Ala. (Diam. 13.7 inches.)

Burial No. 30, a child having pierced *Marginella* shells at the neck.

Burials hitherto undescribed were as follows: adults, closely flexed on the right, 2; closely flexed on the left, 1; closely flexed to the left, 1; partly flexed to the right, 1; partly flexed to the left, 2; partly flexed on the right, 1; adolescents, partly flexed to the right, 1; partly flexed on the left, 1; children, 3; a disturbed burial.

Articles placed with the dead at this place seemed to be in the main objects wrought from shell, though one could wish the fashion had been more comprehensive. A marked feature was the attention shown to children, for while but three out of fifteen adults had artifacts in association, six children out of nine had been thus favored.

Found in the digging, but apart from burials, were: two bowls, undecorated and of very coarse ware, one within the other; parts of a gorget of shell, probably scattered by some disturbance, which, restored as to a small part not recovered

proved to belong to the same class as the one described from this place, and also has its decoration on the convex side; half of an undecorated gorget of shell found with the other; a part of a good-sized bowl, restored and shown in Fig. 61, found in fragments just below the surface and bearing a decoration often seen on earthenware farther south in Alabama; a sherd bearing a complicated stamp design (Fig. 62); a number of flint arrowheads and knives similar to those found on the surface; hoes wrought from musselshells, having each a perforation for a handle; an amulet of the bar variety, of impure hematite, having two perforations; a disc of copper with indentations around the margin, with opposite sides bent over in a way that one overlaps the other; a graceful celt of volcanic rock,somewhat more than 4 inches in length; red ochre pigment; arrow flakers of antler that had been set in handles, which, however, were not found.

Fig. 62.—Pottery with complicated stamp decoration. Near the Cox Mound, Ala. (Full size.)

The ridge west of the mound is of brown loam, the dark, midden soil, such as was present on the opposite side, being absent. There was almost no midden debris on the surface, except broken shells, and these were on only limited areas. Some digging was done in this part of the ridge, but though shells were mingled with the soil, showing aboriginal agency in the deposits, no burials were encountered.

This site, which evidently is pre-Columbian, or in all events dates from a period when the region had no intercourse with white people, has a considerable history as to human bones plowed up and artifacts discovered. We were informed by Mr. Cameron, the owner, that from the ridge where we dug, a bicave stone "as large as a saucer" had been taken, and we obtained from him a ceremonial axe of the hoe-shaped pattern, which he informed us had been found on the place.

Mounds on the Rudder Place, Jackson County, Alabama.

On property of Mr. Hugh Rudder, who lives somewhat back toward the hills, is a mound in sight from the river-bank, rectangular with a flat top, 13 feet high and 100 feet by 114 feet diameters of base. Two holes of considerable size were in the summit-plateau, but did not seem to have been deeply dug.

Within a few yards of this mound is the remnant of another, 2 or 3 feet in height, which, like the field from which it rises, was planted in wheat at the time of our visit. Permission not granted.

Mounds near Widow's Creek, Jackson County, Alabama.

On the left side of the river, going up, about one mile above its junction with Widow's creek, on the property of Mr. W. S. Allen, of Bridgeport, Ala., are two mounds in a cultivated field near the river bank, less than 50 yards apart.

Mound A.

Mound A, which may have been under cultivation in the past, though not in recent years, was turtle-shaped, its height from the outside being 6.5 feet, its diameters 75 feet and 45 feet.

An excavation 12 feet square, sunk centrally to the base, which reached dark alluvial soil at a depth of 8 feet 4 inches, showed the mound to be composed of layers, some almost entirely of musselshells, some with a small proportion of earth mingled with shells, some having shells and material made up principally of ashes.

Our excavation gave evidence also that the height of the mound from the outside was misleading. The discrepancy was accounted for by the discovery that a considerable deposit of midden soil around the mound in the field had lessened the original altitude.

The base of the mound, on which was a fireplace, was carefully dug through in the hope of determining the presence of a pit or pits, but without success.

Burial No. 1, closely flexed on the left, had a slab over the feet, legs, and one hand. The skull was missing. Depth, 2 feet 8 inches.

Burial No. 2, adolescent extended on the back, 5 feet down. At the right ear were three pearls, and two were at the left ear, all comparatively small, four flat like discoidal beads, one an oblate sphere, all pierced. At the right wrist was a beautiful pearl, oblate-spheroidal in shape, .5 inch in diameter, without patina, having a beautiful luster. The piercing of this fine pearl and the effect of time had deprived it of any value it might have had as a gem. At a site where musselshells were as abundantly used as they seem to have been at this place, pearls doubtless were numerous.

Burial No. 3, at a depth of 3 feet 4 inches, six slabs and a fragment of stone had been irregularly placed. On these rested the skeleton of a child, above which, not always in contact but mingled with shells of the mound, had been piled other masses and slabs to almost within one foot of the surface.

In another part of the mound stones piled as for a grave were discovered, much resembling those found with Burial No. 3, but no bones lay beneath or among them. It is possible that the remains of an infant with which they had been placed had decayed away.

Burial No. 4. At a depth of 3 feet 8 inches were disturbed bones of an adult skeleton and scattered masses of rock, no cause for this being apparent.

Burial No. 5, covering that part of the base of the mound which was reached by our excavation (supposing the alluvial soil without shells to have been the base, which seems likely), was a layer of ash material and shells. At one part

of this layer were considerably fewer shells than were present in the other parts. In fact, the space in question was almost without them.

At this place a burial had been made, presumably when the mound was in a period of growth but still was insignificant in height. In the ash material without shell a grave 7.5 feet long and about 26 inches in maximum width had been dug to a depth of 1 foot 7 inches. Next, into the grave had been placed shells

Fig. 63.—Burial No. 5. Not a box-grave but a placement of masses and slabs of stone, 7 feet 9 inches by 2 feet 8 inches, piled over a burial. Widow's Creek, Ala.

without admixture of foreign material, to a depth of about 7 inches, on which the body had been placed at full length on the back, arms along the sides of the trunk, and the space above and around had been filled with musselshells. Then above the burial had been piled a placement of slabs and masses variously of limestone, of sandstone, and seemingly of claystone, 7 feet 9 inches long and 2 feet 8 inches in maximum width, which was at the foot of the grave (Fig. 63). This placement consisted of masses and slabs in double layer which sometimes

rested on masses that had been placed here and there as supports at the sides, but which were far from continuous. As none of the covering stones resting on the supports was of a size sufficient to span the grave and hence lay diagonally, while others had been placed without side support, the upper surface of the placement was very irregular.

From the top of this stone grave to the surface of the mound was 5 feet 4 inches. That the grave had not been dug down from any part of the mound above was clearly shown by the presence of unbroken strata to the surface.

Here ends the record of the burials from the central excavation in Mound A.

On each side of this excavation, in the line of the longer axis of the mound, a hole 10 feet square was dug to the alluvial soil, resulting in the discovery of burials as follows:

Burial No. 6. Beneath a slab of claystone, 2 feet by 1.5 foot, that lay 10 inches below the surface, were the bones of a child, 2 inches of shell material lying between them and the slab.

Burial No. 7. Six feet from the surface, in what seemed to have been a pit, though its beginning could not be determined, the strata in the side excavations not being so clearly defined as they were in the central one, though the pit was distinctly marked at its base, lay a skeleton at full length on the back, the grave there averaging 6 feet 8 inches long and 2.5 feet wide.

On and around this skeleton was a placement of stones and slabs, as follows: A slab 35 inches long by 23 inches wide lay immediately over the trunk and skull of the skeleton. Placed diagonally, so that it slanted over that part of the great slab which covered the skull, was a thick mass of stone. Beginning somewhat above the shoulder, on the right side, there continued along the skeleton, in line to the knee, a slab, three small masses, and another slab, in the order named, the two slabs being placed on edge and projecting above the burial, the three masses simply being at its level. Beginning on a line with the top of the skull on the left side and continuing down almost to the pelvis was a long slab on edge rising above the burial, and a number of small masses of stone in line, all resting on the great slab that lay above the skull and the trunk of the skeleton. Above these masses, but not in contact with them, were other small masses in the shells.

In a rude semicircle around the feet and ankles, four masses of rock had been arranged. One of these, of sandstone, 16 inches by 12 inches, by 7 inches in thickness, flat on two opposite sides, had been used on both of them as a mortar, and also probably to crack nuts upon, as on one side the depression was accompanied by seven small pits and on the other by ten of them. This interesting stone has been placed on exhibition at The Academy of Natural Sciences.

From the pelvis down the skeleton was not covered.

Burial No. 8, a skeleton partly flexed on the right, 3 feet from the surface.

Burial No. 9. At full length on the back, 4 feet down, lay a skeleton having

a mass of stone over the head. Near the thorax was a slender, triangular arrowhead of flint.

Burial No. 10. Ten inches below the surface stones and slabs were reached, arranged in double layer in an irregular circle, 3 feet 5 inches by 2 feet 9 inches,

Fig. 64.—Burial No. 10. A placement of masses of stone and slabs, 3 feet 5 inches by 2 feet 9 inches, lying above the skeleton of a young child. Widow's Creek, Ala.

as shown in Fig. 64. Below these came a layer 2 inches in thickness, of the shell material of the mound lying on the skeleton of a young child, crushed almost flat.

Burial No. 11. Fourteen inches down were the bones of a child, and piled above them, in a very irregular way, were small masses of stone and slabs with a few larger ones.

Three feet from the surface was a placement consisting of masses and slabs of moderate size, having the outline of an irregular, horizontal triangle with an altitude of 6.5 feet and a base of 5 feet 8 inches. These stones and slabs, contiguous as a rule, were arranged, however, so that several spaces of moderate size were left uncovered. Below this layer was an occasional mass of stone, but not in sufficient number to be considered a second layer. No trace of bones lay above or below this assemblage of masses.

In one corner of one of the smaller excavations in this mound, extending 16 inches below the base, was a circular pit 30 inches in diameter, filled with ashes and fragments of rock.

Apart from human remains in this mound were found separately a number of implements of bone, some in excellent condition; a celt of indurated shale, 5.6 inches in length; a circular mass of sandstone about the size of a fist, having on two opposite sides a pit probably to aid in cracking nuts; many portions of antler partly wrought; arrow flakers of antler, whose handles, however, were not found; an ear-ornament of antler, having below the head a groove showing polish through wear (Fig. 65).

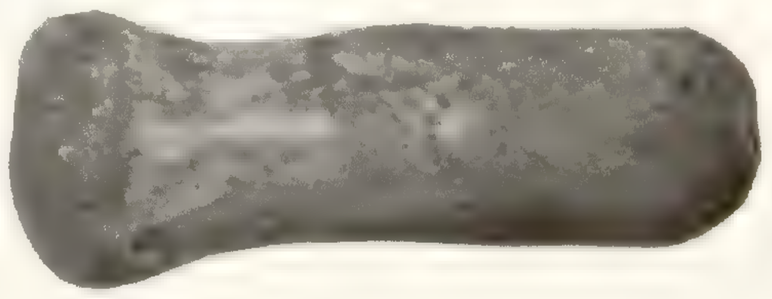

Fig. 65.—Ear-plug of antler. Mound A, Widow's Creek, Ala. (Full size.)

Mound B.

Mound B, 80 feet by 60 feet in diameters of base, had a height of 3.5 feet, measured from the exterior, though the distance from its summit to undisturbed, alluvial soil was 2 feet greater This mound, long plowed over and much extended, was composed of musselshells in a way similar to Mound A.

Three burials near the surface had been plowed away in places. Burial No. 4, a child, and Burials Nos. 5 and 6, all superficial, were closely flexed on the left.

Burial No. 7, a skeleton lying on the right side, almost at full length, the thighs, however, slightly flexed, forming an obtuse angle with the trunk, the legs continuing down in a line parallel to the long axis of the trunk. The right humerus was in front of the face, the forearm under the upper part of the cranium. The left humerus formed a right angle with the trunk, the forearm flexed, bringing the hand to the forehead. The skull, of a yellow color, was crushed into small fragments and flat, resembling a squash that has been trampled upon.

This burial was covered by a placement of stones and slabs in double thickness, 8 feet long, 3 feet 9 inches at one end and 2 feet 9 inches at the other, much similar to the arrangement described in connection with Burial No. 5, Mound A, at this place, though the one in Mound B showed more irregularity. Its upper parts lay 1.5 foot below the surface.

This burial had been a dual one. Between the two layers of slabs and masses that covered Burial No. 7 there lay at the head end of the grave, in complete disorder, a flattened mingling of the bones of an adult skeleton.

Three feet from the top of the mound lay masses of stone and slabs with spaces between. Above these, here and there, in no evident order, were masses of stone. No disturbance was apparent and no burial was present.

Apart from bones were found, in Mound B, a small piercing implement of bone; a rude, triangular arrowhead of flint; a coarse, cutting implement of sandstone; part of an earthenware pipe.

Mounds near Williams Landing, Jackson County, Alabama.

There are four mounds and a shell-heap on the property of Judge J. J. Williams who lives upon it, somewhat back in the hills.

Mound A.

The steamboat landing on this estate is known as Williams Landing, otherwise Lone Oak Landing. About three-eighths of a mile N. from this landing, on the crest of a low hill rising from bottom-land, was a symmetrical mound in woods, overlooking the river, 6.5 feet in height and 45 feet in diameter of its circular base. Around it was a trench, almost filled at the time of our visit, whence came the raw clay and pebbles of which the mound mainly was composed. In the center of the summit was a small hole which proved to have been carried down but a short distance. Around its margin were masses of stone which evidently had been taken from the mound.

Two feet four inches from the top was a bed of slabs (such as we tested were of limestone), 6 feet 9 inches in length by 4 feet 7 inches in width, somewhat disturbed by the previous digging. When found, this placement had an irregular outline; it was composed of slabs in double thickness in places, and of single slabs and masses of rock in others, while in some parts no slabs or masses were present.

On this had rested a burial, fragments of which, disturbed by the former digging, remained.

Four feet eight inches down, beyond any chance of disarrangement by the previous diggers, were a few fragments of human bones.

Near the center of the base, which could be distinguished because at that point ended the slight stratification that prevailed in the mound and red clay of uniform shade began, lay the bones of a child closely flexed to the right, flattened to an extent almost to resemble the skeleton of a fossil fish. Directly on these bones slabs had been placed, and above these again were masses of stone piled irregularly, not in contact but surrounded by earth.

Almost contiguous to this burial, at the same level, lay a skeleton closely flexed on the right, having the humeri partly in front of the thorax and the arms closely flexed, bringing the hands up in front to the face. The thighs and tibiæ, as in the case of a closely flexed burial, were drawn up parallel to the body.

Back of the skull and behind the pelvis were two small masses of stone, and somewhat in front of each of these masses, as if possibly they had been intended

as supports, were two slabs that perhaps had slipped from the masses which otherwise would have held them diagonally over parts of the skeleton. As it was, most of one slab which would have covered the skull and much of the upper part of the trunk, lay forward from them, covering only the facial part of the skull, and the hands. The lower slab, which had slipped less (if displacement occurred), lay over the pelvis, the lower ribs, and most of the lower extremities. There remained uncovered, then, much of the skull, the upper part of the trunk, and the knees.

This burial with its covering occupied a space 3 feet 7 inches long and was 2 feet 3 inches in maximum width.

Beginning at about the center of the base and extending outward was a pit, oblong with rounded corners, 5.5 feet in length and 3 feet 7 inches in width, having a depth in the undisturbed clay below the base of 1 foot 2 inches. Presumably this pit had been made prior to the building of the mound and had not been dug down through it, as undisturbed, local strata were noted almost above it. Most careful search in this pit, which was cleared with the aid of trowels, failed to discover any trace of bones, which beyond doubt had decayed away.

Mounds B and C.

Within a short distance of Mound A were Mounds B and C, respectively 2 feet 7 inches high and 32 feet in diameter, and 3 feet in height with a diameter of 50 feet. Considerable digging in the larger mound was unrewarded.

Mound D.

Mound D, about one-half mile NNE. from Williams Landing, was on sloping ground just above the flat bottom-land, in full view from the river. This mound had a circular base about 50 feet in diameter and was 6 feet 8 inches in height, according to a measurement taken from the outside. A second measurement made from the summit to the base of the mound showed that the height as ascertained from the outside was about correct.

Previous to our coming a hole had been dug in this mound nearly at the center of the top, about 3 feet by 5 feet in size and presumably of considerable depth. From it had been thrown out a number of masses of limestone. There was evidence also that a small trench had been dug in from the outside, which, however, had been filled.

The central bulk of the mound was surrounded and dug out by us to below the base, the size of the excavation being 37 feet by 40 feet, which practically included all the interesting part of it, judging from the fact that with the exception of one superficial burial none was reached until considerable digging toward the inner part had been done.

The mound proved to be of rich, dark, loamy clay, evidently the deposit of a dwelling-site which had overlain the field to a depth of 6 inches, as was apparent from the unmixed layer of midden material found at the base of the

mound, above which the mound had been built of the same material but considerably mingled, as would be expected when it was gathered from the field around.

This mound, which would have been of great interest had the aborigines who made it been endowed with a more liberal spirit in respect to their dead, had been built over a shallow grave containing a burial below the base of the mound. Some burials apparently had been deposited on the base, while others had been placed in the body of the mound, most of these being in grave-pits, some clearly let down from the surface, others being traceable some distance up, but not all the way.

In all, thirty-six burials were found, no account being taken of bones scattered by the previous digging, by the sinking of pits in aboriginal times, by the roots of a tree which grew well up on the mound, or of small portions of skeletons buried by the aborigines themselves, some of which, probably similar to interments found in other mounds, were bones that had dropped away from skeletons previous to the time of burial and later were gathered and interred.

In the case of Burial No. 30 in this mound, an interesting example of the aboriginal interment of fragmentary remains is shown.

The grave below the base of the mound (Burial No. 36), to which reference has been made, was 7 feet 10 inches to the bottom of its pit from the level of the summit of the mound, the pit itself cutting through the 6 inches of midden soil marking the base and entering the undisturbed, red clay a distance of 1.5 foot, the limits of the grave being very clearly defined in the raw clay. The depth of the original midden deposit on the field, of which we have spoken, was conclusively proved by the presence of the red clay around the sides of the grave which had been thrown out when it was dug and had not been used in filling the grave. This red clay lay over the 6 inches of surface midden debris on which it had been thrown.

The grave, which was 6 feet 8 inches long by 3 feet 2 inches wide, began about 4.5 feet from what we considered to be the center of the base of the mound, radiating from it, the head of the grave nearest the center, as shown by the presence of a fragment of skull about one inch square, which was the only part of the skeleton found, even no teeth being present, though the entire contents of the grave was removed with a trowel.

Over this grave, as stated, having the red clay that had been removed in its making spread for a considerable distance around it, the mound had been built, its inception being presumably at the time of the interment, since the grave was filled, not with the clay that had been taken out, but with the midden material of which the mound was made.

Practically on the center of the base of the mound was a deposit of calcined human bones, 3.5 feet by 1 foot 9 inches and 3 inches in maximum thickness. These bones, reduced to fine particles, bore no trace of order and were in the vicinity of no sign of fire. This deposit (Burial No. 35) is classed as one burial, though it is probable that the remains of two individuals were present, side by

side, as a space 8 inches broad, on which were only scattered fragments, divided the deposit into two parts. These cremated remains presumably were placed there at the time the erection of the mound was commenced.

In addition to Burials Nos. 34 and 35, the following, some of which lay on the base while others were in grave-pits, seem to demand detailed description.

Burial No. 1, 3.5 feet under the slope of the mound, was a placement composed of eight slabs, some of limestone, some of silicious, veined material, evenly and symmetrically laid in contact, which measured approximately 4.5 feet in length

Fig. 66.—Burial No. 1. A skeleton lying upon a flat bed of slabs, 4 feet 6 inches by 2 feet. Mound D, Williams Landing, Ala.

and 2 feet at the broadest part, where a single small slab had been placed at each side of the general alignment to accommodate the increased space demanded by the trunk and the knees.

The skeleton lay closely flexed on the right, the dexter humerus under the chest, its forearm flexed, bringing the hand in front of the face, the left humerus down, having the forearm slightly flexed into the pelvis. The thighs were up against the body, having the tibiæ flexed on them (Fig. 66).

Burial No. 7, 4 feet 9 inches below the slope of the mound, was a bed of thin slabs, closely laid in a double layer, 5 feet 6 inches long by 3 feet wide, completely protecting a skeleton partly flexed on the right, which rested immediately below. Over the lower part of the skeleton and the covering of slabs, and somewhat above the latter, were several masses of rock in the soil, separate and without arrangement. The right humerus of the skeleton lay under the thorax, somewhat forward, the forearm partly flexed, bringing the hand to the right knee, the left upper arm extended downward in front of the thorax, the forearm being at a right angle back on the trunk, not forward as one would expect it to be. Back of the skull was a bone pin, much decayed, that probably had been in the hair.

Burials Nos. 8, 14, 15, a child and two younger children, respectively, in shallow graves extending down from the surface of the mound, the bones covered with deposits of musselshells, above which to the surface were musselshells mingled with earth.

Burial No. 13, a grave-pit 5.5 feet deep, 3.5 feet by slightly more than 2 feet, was clearly traceable from, or almost from, the surface of the mound, extending 9 inches into undisturbed clay below the base. This pit contained a skeleton lying closely flexed on the right.

Burial No. 17, the skeleton of a child lying near the surface, doubtless in a grave but having no musselshells in association.

Burial No. 21, a pit clearly defined, at the bottom of which, 3.5 feet down, was a skeleton lying closely flexed on the left, the pit being filled with soil and musselshells mingled

Burial No. 25. This burial was of a class to be described later in this report in connection with the Hampton Place, Hamilton County, Tenn., where burials, closely flexed, were placed almost vertically in narrow pits, the pelvis at the bottom of the pit, the arms and legs flexed against the trunk.

Burial No. 27, 2 feet 8 inches below the sloping surface of the mound, beginning about 7 feet from the center, was a bed of slabs of limestone, 4 feet 7 inches by 3 feet 4 inches, not level as was the placement of slabs with Burial No. 7, but having an irregular surface. There seemed in this case, moreover, to be a tendency toward the enclosed burial as found in the stone box-graves, inasmuch as, in addition to the bed of slabs, there were an upright slab at the head of the bed of horizontal slabs, and another, also vertical, at the side to the left of the slabs but at a short distance from them. Opposite this one had been placed a narrow slab and a mass in such manner that the part of the placement containing the upper portion of the skeleton was surrounded to some extent.

The skeleton lay on its left side, the left femur closely flexed on the trunk, the tibia flexed against the thigh. The right femur was flexed to about a right angle with the body, the tibia closely flexed; the right arm and foream extended diagonally down and forward, the hand being below the left knee; the left arm and forearm were directed in line along the front of the trunk.

Burial No. 30, at the bottom of a pit about 4.5 feet deep, was a stone grave covered to the top of the pit with soil having an admixture of shell and showing the pit had been dug from the surface down. The stone grave, 3 feet 6 inches in length and slightly more than 2 feet in maximum width, had a partial covering and on one side two slabs standing obliquely, with an opening between them at the lower part but in contact at the upper edges. The covering slabs, except

Fig. 67.—Burial No. 30. A placement of slabs 3 feet 6 inches by 2 feet, over all, above a skeleton with which had been interred parts of another skull, visible in the illustration. Mound D, Williams Landing, Ala.

in one instance, did not rest on the upright ones, being immediately on the bones which were on the ground.

The skeleton lay closely flexed on the right, both humeri along the trunk but somewhat toward the front, the forearms flexed to them, bringing the hands in front of the face, though not covering it. The skull, over which no slab had been placed, may be seen in the photograph (Fig. 67).

A curious feature connected with this burial was that between its back and the oblique slabs was a space which had been filled by placing side by side, their upper surfaces exposed, two large fragments of the skull-cap of another skeleton. These also show in the photograph, as they, too, were without covering of slabs. The fragments were of a darker shade than the skeleton, apparently through long exposure or the result of a stain.

Burial No. 31, partly flexed on the left, was the only one from this mound whose skull was in a condition to save.

Burial No. 32, in the sloping side of the mound, was a pit 3 feet 4 inches deep, the lower part 3 feet 9 inches long and 2 feet 9 inches in width, very distinctly marked and sharply rectangular, though it could not be determined with certainty whether the pit began at the surface or somewhat below it. On the base of this pit lay a skeleton closely flexed on the left, the right humerus extending along the thorax, the forearm closely flexed on the humerus; the left arm and forearm arranged in like manner except they lay below the thorax.

Above the skeleton, to a depth of about 10 inches, the grave had been filled with musselshells and masses of rock, having no admixture of soil. Above the skull, but having a layer of shells between, were three masses of fossiliferous, silicious vein material, one about the size of a child's head, one about five times larger, and one intermediate. The upper surfaces of these masses were in line with the top of the shell deposit. About at the level of their bases was a slab of limestone 1 foot 8 inches by 1 foot 2 inches, by 2 inches in thickness, having shells above it and below it. To one side of this slab was a somewhat smaller one of the same material, at a slightly lower level. On top of the shells was a small mass of rock. None of these slabs or masses was in contact with the bones.

Burial No. 34, extended on the back, lay almost at the center of the mound, on or slightly above the base. No mark of fire was near it, though at one spot the pelvis was charred and the upper part of the skull lay in fragments, badly burnt, the lower jaw, however, being intact. This burial lay but a short distance from the deposit of calcined bones, and may have been affected by the fire that reduced them, which, however, must have been elsewhere than in the mound.

The other burials in the mound consisted of twenty-nine adults and seven children, disposed as follows: at full length on the back, closely flexed on the right and on the left, closely flexed to the right, partly flexed on the right and on the left, partly flexed to the right.

No attempt at orientation was noticeable in the burials in this mound.

Besides objects already described in connection with burials, there were found: small bits of mica near the skull of an adult skeleton; two arrowheads of flint, one at the pelvis of an adult burial, one near the shoulder of another; a few badly-decayed shell beads near the neck of a child.

Apart from the burials described, but often near scattered bones, were: seven beads of shell, found together; fifteen arrowheads or in some instances

possibly small knives, of flint, some carelessly made, one of the better ones being shown in Fig. 68; two ornaments of sheet-copper, found separately, each 1.75 inch in diameter, bosses with central depressions, having each a central perforation; fragments of sheet-copper found in three instances; an ornament made of impure graphite, similar in shape to those of sheet-copper, but thicker, 1.5 inch in diameter (Fig. 69).

Fig. 68.—Arrowpoint of flint. Mound D, Williams Landing, Ala. (Full size.)

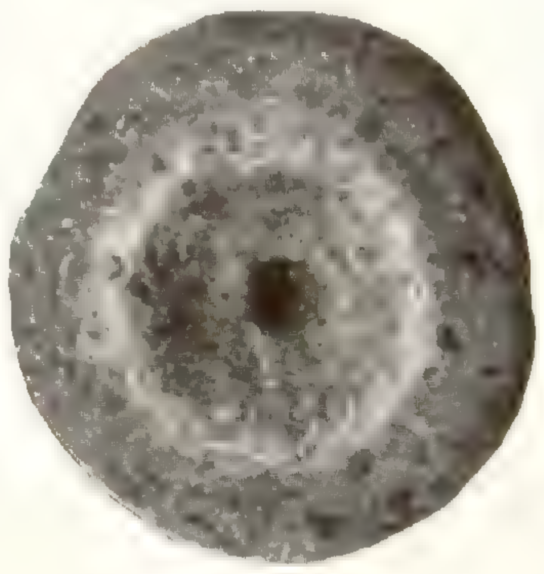

Fig. 69.—Ornament of impure graphite. Mound D, Williams Landing, Ala. (Full size.)

Extending from the base of the mound a few inches into the yellow, bottom soil was a circular deposit of water-worn pebbles, broken and whole, the largest about the size of two clenched hands.

The shell-heap, which was but a few yards from the river, after the first foot had been dug away, proved to be almost solid shell. Its investigation was not further pursued.

Mounds and Dwelling-site on Bridgeport, or Long, Island, Jackson County, Alabama, and Marion County, Tennessee.

Bridgeport Island, or Long Island, as it is variously called, has the lower end in Alabama and the upper part in Tennessee, the state line passing between the mounds on the island, the large mound being in Tennessee, the two smaller ones in Alabama.

The mounds, three in number, in sight from the water, on the eastern side of the island, near its lower end, are near together and form a triangle of which the largest mound is the apex. Bridgeport Island belongs to Mr. John F. Brown, who lives nearby on the mainland. Mr. Brown does not desire any digging on the place.

The largest mound, on which is a small frame structure, has been quadrangular with flat top, evidently a domiciliary mound. Its height is slightly more than 24 feet, its base is about 130 feet square.

The mound farthest from the water has a circular base about 55 feet in diameter and is 7 feet high. It is nearly flat on the summit at present, but has the appearance of having been dug into, and may have had, at one time a more conical outline.

Nearest the water is a mound which presumably has been leveled to some extent to accommodate a barn standing on it. Also, it has been greatly trampled by cattle and is of very irregular outline. Its present height is 9 feet; its diameter, about 110 feet.

Near the mounds is a dwelling-site with much shell on the surface, and some other debris, including fragments of pottery.

Mr. Brown, the owner of this place, has some celts and pottery vessels dug from it, the vessels being of inferior ware and of commonplace form.

PART III.

TENNESSEE RIVER IN EASTERN TENNESSEE.

Our expedition has now left Alabama and the concluding part of the investigation is in eastern Tennessee.

Mounds and Sites.

Dwelling-site on Burns Island, Marion County.
Mound and Dwelling-site at the Mouth of Sequatchie Creek, Marion County.
Dwelling-sites at Shellmound, Marion County.
Dwelling-sites near Riggles Ferry, Marion County.
Mounds on the Bennett Place, Marion County.
Mound and Dwelling-site on the White Place, Marion County.
Williams Island, Hamilton County.
Mounds on the Carter Farm, Hamilton County.
Mound and Dwelling-site at Williams Island Ferry, Hamilton County.
Dwelling-site and Mounds on the Hampton Place, Hamilton County.
Dwelling-site on Chattanooga Island, Hamilton County.
Citico Mound and Site, Hamilton County.
Mound on the Bell Place, Hamilton County.
Mounds on the McKenzie Place, Hamilton County.
Mounds below Harrison Ferry, Hamilton County.
Mound on the Hixson Place, Hamilton County.
Mound at Lovelady Landing, Hamilton County.
Mound near Lovelady Landing, Hamilton County.
Mound below Igou Ferry, Hamilton County.
Dwelling-site on the Davis Place, James County.
Mound and Site on the Eldridge Place, James County.
Mounds and Sites on Hiwassee Island, Meigs County.
Mounds near Armstrong Ferry, Meigs County.
Mounds near mouth of Mud Creek, Rhea County.
Mounds near Gillespie Landing, Rhea County.
Mound near Hoyal Ferry, Rhea County.
Mounds on the Spence Place, Rhea County.

MAP OF TENNESSEE RIVER IN EASTERN TENNESSEE

Scale in miles

0 5 10 30

1915

Mound on the Jones Place, Meigs County.
Mound on the McDonald Place, Rhea County.
Mounds near Cook Landing, Rhea County.
Mounds near Viniard Landing, Rhea County.
Mound on the Luty Place, Rhea County.
Mound on the Keyforver Place, Rhea County.
Mounds on the Kimbrough Place, Rhea County.
Mounds on the Wheelock Place, Rhea County.
Mounds on the Garrison Place, Rhea County.
Mounds on the Lower Hampton Place, Rhea County.
Mounds at Euchee, Meigs County.
Mounds on the Upper Hampton Place, Rhea County.
Mound near Red Cloud Ferry, Rhea County.
Mounds on the Hope Place, Rhea County.
Mounds on the Cagle Place, Rhea County.
Mounds near Jackson Ferry, Meigs and Roane Counties.
Mounds on the Fitzgerald Place, Roane County.
Mounds on the Campbell Place, Roane County.
Mounds near Rockwood Landing, Roane County.
Mound on the Hood Place, Roane County.
Mounds on the Butler Place, Roane County.
Mounds on the Ewing Place, Roane County.
Mounds on the Tedder Place, Roane County.
Mounds on the De Armond Place, Roane County.
Mounds on the Evans Place, Roane County.
Mounds near Hood's Ferry, Roane County.
Mounds on the Goodwin Place, Roane County.
Mounds on the Biss Place, Roane County.
Mounds on Long Island, Roane County.
Mounds near Huffine Ferry, Roane County.
Mound on the Pickles Place, Roane County.
Mounds near Paint Rock Creek, Roane County.
Mounds near mouth of Pond Creek, Loudon County.
Mound near Cave Creek, Roane County.
Mound on the E. E. Blair Place, Loudon County.
Mound on the W. W. Blair Place, Loudon County.
Mound opposite Loudon, Loudon County.
Mound on the Carmichael Place, Loudon County.
Mounds on the Arthur Place, Loudon County.
Mound near Lenoir City, Loudon County.
Mounds opposite Lenoir City, Loudon County.
Mounds on the Edward Prater Place, Blount County.
Dwelling-sites on the S. E. Prater Place, Blount County.

Dwelling-site on Grant Island, Blount County.
Dwelling-site on Cox Island, Knox County.
Dwelling-site on Prater Island, Knox County.
Mound and Site on the Jackson Place, Blount County.
Dwelling-site near Little River Shoals, Knox County.
Mound opposite Looney Island, Knox County.
Mound near Knoxville.

Dwelling-site on Burns Island, Marion County.

Burns Island, belonging to Mr. Leroy Peoples, has upon it two rises on which are frame structures, and a dwelling-site with much shell upon it. Permission not granted.

Mound and Dwelling-site at the Mouth of Sequatchie Creek, Marion County.

On the lower side of Sequatchie creek, at its union with Tennessee river, is a large property belonging to Mr. W. S. Wilson, who resides somewhat back from it on the hills.

In full view from the river is a mound to some extent on sloping ground, so that measurement of height depends on whence it is taken. It would be safe to call the height of the mound 20 feet, approximately. This mound, doubtless domiciliary and quadrangular with a flat top in the past, at the time of our visit was of very irregular outline through cultivation of its sides and through wash. Its basal diameters were 205 feet and 185 feet.

In the hope of coming upon superficial burials, trial-holes were sunk in the summit-plateau, but with the exception of one, where a few fragments of human bones were encountered, nothing was found, and all the holes soon reached raw clay in which burials could hardly be expected.

The dwelling-site, most elevated near the river, extends for a considerable distance along the bank at varying widths to, or almost to, Sequatchie creek, the ending of the site being apparently about in line with the mound, which stands somewhat farther back from the river.

On the surface of the site were many fragments of shell and some of stone and of pottery, a number of bits of the latter having the check-stamp by way of decoration. Complete artifacts were almost absent, and even fragmentary ones were extremely scarce, a few arrowheads or knives being the only unbroken objects gathered superficially. Careful search over all the surface of the site came upon no human bones, nor could we learn of any history of the discovery of burials or of artifacts by those cultivating the place.

Two days' digging with eight men at work at this site failed to discover a cemetery, all the slight rises being carefully examined to no purpose.

The midden debris on this property extended deeper than is usually the case in sites of this kind, some of our trial-holes going between 7 and 8 feet without

reaching undisturbed soil, though the black earth filled with fragments of shell, of which the site was composed, was seldom deeper than 5 feet.

But three burials were encountered, all considerable distances apart and at varying depths, hence it is possible that the makers, who must have occupied the site a long time, however, were buried here and there throughout all its extent and that their remains could be reached only by long-continued digging which, under the circumstances, would not be wise to undertake.

The burials were not in graves the limits of which could be traced, but probably had been interred in rather shallow ones dug into the homogeneous deposit, which were filled by the return of the material taken out. The unusual depth of two of them can be accounted for by the probability that the growth of the site continued long after the burials were made.

Burial No. 1, a child, 6.5 feet deep, having at the neck four well-preserved shell beads, the largest of which, an oblate sphere, was .75 inch in diameter.

Burial No. 2, partly flexed to the right, lay at a depth of somewhat more than 2 feet, the pelvis resting in a good-sized fragment which had formed part of a large vessel of earthenware. The skeleton lay on the midden soil, earth blackened by admixture of organic matter, and having a considerable proportion of shell, but was covered at the sides and on top by a deposit of sand, 10 inches deep above the skeleton. On this sand, above the lower part of the trunk of the skeleton, three slabs of limestone had been placed, the largest 19 inches by 17 inches, and 2.5 inches thick. The others, much smaller, had been arranged, one partly beneath the large slab, the other beside it.

At the neck of the burial had been two large, tubular beads of sheet-copper, much of which had corroded away.

Near the head and shoulders of the skeleton was a placement of slabs of limestone in the form of a rude semicircle, consisting of a floor of slabs laid flat and surrounded on the peripheral part by other slabs, set vertically, whose upper surfaces, however, were far from being at a uniform level. The floor of this combination of slabs was not on a plane with the burial, which was considerably above it, at about a level with the top of the vertical slabs. The open part of the placement was away from the burial.

This placement, which had a basal diameter of about 2 feet and was 2 feet 9 inches across at the top, had a depth of about 10 inches. It contained no evident sign of a burial, though on part of its base was a dark deposit that may have been all that remained of the skeleton of an infant. We think it doubtful that this placement had any connection with the burial near which it was.

Burial No. 3, a child, lay 7.5 feet down on brown sand. Above it for 2.5 feet was sand similar to that on which the burial lay, but having a slight sprinkling of shell. Above this was the black soil and shell of the midden deposit. This burial must have been made at an early stage in the occupancy of the site.

Throughout the digging, apart from burials, were: a vessel of earthenware having two loop handles, and knobs at considerable distances apart, somewhat

below the opening; a number of rude spades of limestone, the largest about 10 inches in length; several flints with sharp points and cutting edges, the largest 4.75 inches in length; several small flint knives and scrapers; half of a bar-amulet of limestone; an amulet of similar shape and material but without perforations; several pebbles worked into the form of celts, one 5 inches long, and given unusually sharp cutting edges; a small triangular point of flint; a curious tool wrought from the antler of an elk, slightly more than 6 inches in length (Fig. 70).

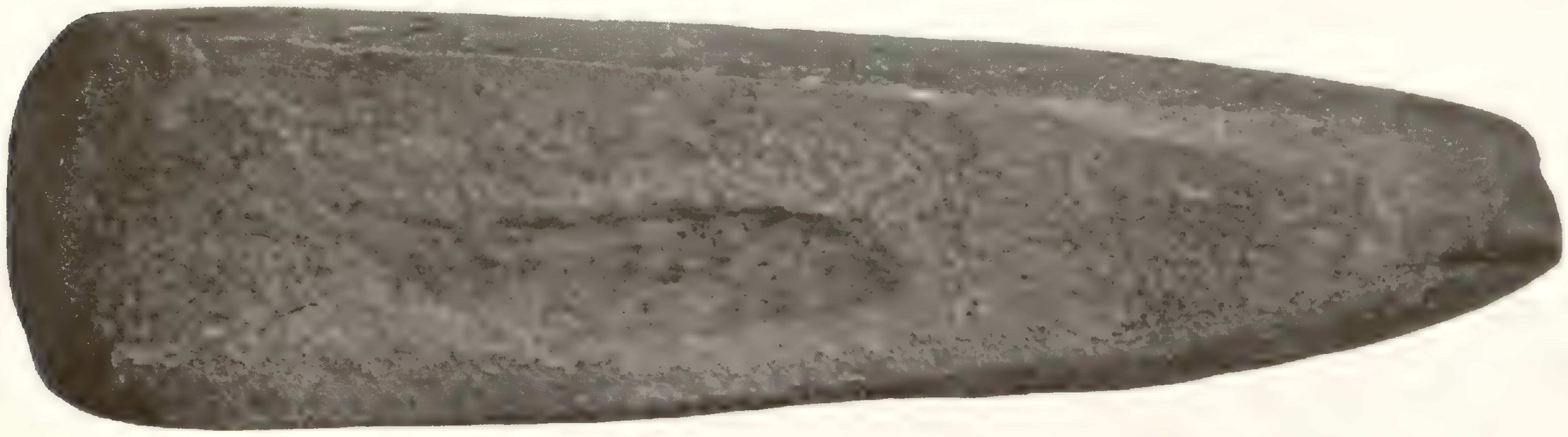

Fig. 70.—Implement of elk antler. Sequatchie creek, Tenn. (Full size.)

Dwelling-sites at Shellmound, Marion County.

The name of this place is derived from a shell deposit formerly there, in or near which human bones and artifacts were found when the railroad, by laying its track, cleared away the shell-mound and adjoining area. The place, however, had been dug into for relics since the time of the Civil War, and probably before.

A short distance N. of W. from the railroad station, in a cultivated field along the railroad track, belonging to Mr. W. Y. Burnett, resident nearby, was a slight rise about 50 feet in diameter, on which were scattered fragments of shell and an occasional bit of stone. Considerable digging showed the soil to be dark with organic matter and having a considerable sprinkling of shells, the underlying, undisturbed ground being reached somewhat more than 2 feet from the surface.

A single trial-hole resulted in finding four burials, two immediately above two others, one being partly flexed to the left, the skull of which was saved; two partly flexed to the right, one being the bones of an adolescent. The fourth skeleton was that of a child. Considerable digging in and near a neighboring shell deposit was without success.

Dwelling-site near Riggles Ferry, Marion County.

On property of Mr. William Gowins, who lives upon it, are a number of dwelling-sites having little on the surface except shell, extending for half a mile down from the ferry in fields bordering the river. Careful digging showed

these sites had but little depth and presumably were without burials. A fragment of pottery bearing a complicated-stamp decoration was picked up on the surface.

Hale's Bar, Dam and Lock.

Next in our investigation along the Tennessee we reach the dam and lock (shown on the map) which recently has been constructed about 33 miles by water below the city of Chattanooga and which has transformed Tennessee river for about 35 miles up, by water, into a kind of pool, navigable the entire year, and furnishing power for various public and private utilities in Chattanooga and beyond.

The permanent rise in the river above this dam, while of great benefit in various ways, has submerged a number of aboriginal sites which our agent, descending the river before the dam was operative, had discovered for us, though some places in this region, fortunately for us, were on ground not affected by the water.

Mounds on the Bennett Place, Marion County.

On the left-hand side of the river, going up, is a large property belonging to Mr. Samuel Bennett, who lives somewhat back from the river, on the hills. The lower-lying part of this great estate, abreast of which in the past was an island noted for aboriginal relics discovered there, has been submerged in common with the island since the completion of the great dam.

At the time of our visit (November, 1914) unusually low water prevailed in Tennessee river, and in consequence several small islands were noticeable in this submerged area, all in full view one from another, and two at least of which owed to aboriginal occupancy their height above the general level of the submerged ground.

Mound A.

Mound A, that nearest the river, stood, when we were there, on ground oblong in outline with rounded corners, whose extent out of water was about 120 feet by 75 feet. The maximum height of this area was 4.5 feet above the level of the river at that time.

As it was impossible to decide from the exterior just what part of this area constituted the mound, preliminary excavations were made which soon showed we had to do with an aboriginal earthwork of a most unusual kind, in whose making the ceremonial use of fire had been accorded a prominent part.

An excavation 47 feet by 65 feet, including the highest part of the area above water, was then made, which showed that a part of this area, about 34 feet by 61 feet, had been devoted to burials and to ceremonies connected with fire, as may be seen on the plan of the mound (Fig. 71) made by Doctor Miller on the spot. It will also be noted that a few scattered burials were present outside the burnt area.

FIG. 71.—Plan of Mound *A*, showing burials. Bennett Place, Tenn.

Unfortunately, the base of the mound was not determined, as holes sunk below the level of the river quickly filled with water, though it was discovered that layers of clay reddened by heat and other evidence of the use of fire were present somewhat below water-level. However, as no burials were encountered at a depth greater than 3 feet, except a stone grave which will be described in due course, it is to be hoped that no feature of special importance has been omitted from our investigation of this interesting mound.

About 3 feet below the highest part of the elevation and, of course, correspondingly less under the slope, was clay reddened by heat. This red clay was not in a continuous layer, though it covered most of the area where it was found, but seemed to have been spread in various deposits ranging in maximum thickness between 2 or 3 and 16 inches, the last being very exceptional.

Between these deposits of reddened clay, some of which were much more extensive than others, were spaces of limited extent but sufficient to prevent the deposits from forming a continuous layer. In areas where burials were not present, however, and yet red clay was found, this clay was scattered over the surface and not arranged in heaps.

At about the same level, immediately beneath the deposits of burnt clay, sometimes individually, sometimes in groups, were burials, charred, burnt, or calcined, as the case might be. In spaces between the deposits of clay also were a few burials unaffected by fire, while some, partly covered, showed the effect of heat only where the clay had rested upon them. Moreover, several burials were found on the upper surface of the burnt clay. These burials, however, were only parts of skeletons—single skulls in two instances—which seemed to have been left over, as it were, then gathered and placed on the clay after it had been distributed above the other burials. That the clay was still hot when these fragmentary burials were placed upon it, was clearly shown by their under surfaces, which were burnt; their upper parts, be it said, showed no trace of fire.

The degree of heat-action exhibited by the bones seemed proportionate to the thickness of the reddened clay resting upon them, some being only charred, others much burnt, while many were calcined.

Most of the burials lay in anatomical order, though the bones were often in small fragments. A few of the burials, however, were only parts of skeletons which probably had been carried out as such from the dead-house and interred with entire skeletons the bones of which were still held together by ligaments.

Below such burials as were beneath the clay was a layer of black material, carbonized by heat, an inch or two in thickness. This material was the remains of matting, fabric, and other organic matter evident in the carbonized material, which probably constituted the lower part of the wrappings of the burials that had escaped the fiercer heat above, and also may have included matting placed ceremonially on the ground to receive the burials.

A measurement selected at random in the course of the excavation was as

follows: Clay reddened by fire, 6 inches in thickness; below the clay, bones in order but calcined and crushed, having a thickness of 2.5 inches; below the bones, carbonized remains of matting, etc., 1.25 inch thick.

Below burials not affected by fire this carbonized layer was not present, some of these burials lying upon a thin, dark line visible through the mound and which probably marked a period of occupancy. This layer showed the level at which the burnt burials lay and was smooth like a floor. The ground beneath the unburnt burials, however, was comparatively soft, while under those which lay below the reddened clay the soil was hardened though not discolored by heat.

We shall now discuss the method adopted by the aborigines for the cremation which probably took place at one time. The reddened clay was made up of masses of different sizes, some bearing imprints of reeds, grass, etc., and seemed to have formed part of a wattle-and-daub building or buildings, the burning of which in connection with aboriginal burials has been described in the case of an Arkansas mound,[1] and of the kind found by us at the base of the large mound on Little Island, South Carolina,[2] though this had not been destroyed by fire.

It seems likely, then, that a building or buildings, the limits of which, however, we were unable to determine by the presence of post-holes, were burnt and that some of the clay which fell at the collapse of the structure, while still intensely hot, was piled over the bones, covering most of the burials completely but leaving parts of some uncovered, and the areas shown on the plan containing no burials, which showed burnt clay to a lesser extent than the other parts, were spaces from which the clay had been gathered to heap over the burials, some of it, however, being left.

In different parts of the mound two trenches were encountered in connection with post-holes, but these trenches and holes penetrated the red clay we have described and the burials beneath it, and consequently were not of their period. They belonged, presumably, to another deposit of clay reddened by fire, which was encountered in the mound, about 14 inches above the one we have described. No burials lay immediately below this upper deposit, which differed from the lower one in that it was not heaped up in places, but extended evenly and had mingled with it charcoal, carbonized, coarse matting, thatching, etc. Presumably, after the mound had been filled in over the burial layer, another structure was erected which in its turn was destroyed by fire, though perhaps not intentionally, and in all events not in connection with burials.

Our theory as to the method pursued by the aborigines in connection with the bones showing evidence of the effect of heat is as follows: But little charcoal was present in or on the red clay above the burials, none being found over con-

[1] 12th An. Rep. Bur. Am. Ethn., p. 206 *et seq.*

[2] "Certain Aboriginal Mounds of the Coast of South Carolina," Journ. Acad. Nat. Sci. Phila., Vol. XI, p. 154.

siderable areas, and it is clear that the bones were burnt and calcined, not by the direct use of fire, but through contact with the heated clay placed upon them. This use of burnt clay in connection with burial rites is interestingly shown in connection with Burial No. 62, at the Citico Place, above Chattanooga, described in this report.

We shall now take up the description of each burial found in Mound A, prefacing the account with the statement that the entire deposit of red clay above the burials, and the burials themselves, were carefully removed with trowels, and that no account is taken of various scattered bones present in the mound, which did not seem of sufficient importance to be designated as burials. All burials not otherwise described showed the effects of heat to a greater or less extent. The reader will bear in mind that burials are of adults unless otherwise stated. As the plan clearly shows, the burials headed in all directions.

Burial No. 1, a child, lay outside the burial layer connected with the reddened clay and had been let down into a grave which cut through the upper layer of burnt earth. This burial, of course, showed no trace of the effect of heat.

Burial No. 2, a child, under the same conditions as the preceding one, had a hatchet of indurated shale, 6.2 inches long, at the left hand.

Burial No. 3, an infant in a grave like the others, having a few shell beads at the neck and, resting on the skull, what had been a handsome ornament of sheet-copper, representing an eagle.

Burial No. 4, a child, also in a grave apart from fire, having at the head an urn-shaped vessel of coarse ware, undecorated, of a capacity of about one quart.

Burial No. 5 lay extended on the back, the left arm and forearm along the body, the right forearm flexed back to the upper arm, which was somewhat away from the trunk.

Burial No. 6, on the back, the legs slightly flexed to the right.

Burial No. 7, closely flexed, face down, the knees slightly to the left. Charred fabric and beads of shell were at the pelvis. These beads, like all found in this mound, are in excellent condition, blackened by heat but not otherwise injured by it.

Burial No. 8, closely flexed on the right. Under the skull had been a mat made of reeds, and a flint knife 8.4 inches in length.

Burial No. 9, closely flexed to the left. The skull of this burial, which presumably had been in small fragments, probably had been thrown out in making one of the original trial-holes.

Burial No. 10, closely flexed on the left, one of the burials described as showing no trace of fire. At the skull was a chisel of indurated shale, 4.1 inches in length. At the feet was a small arrowpoint of flint.

Burial No. 11, closely flexed on the left. At the knee was a hatchet 5 inches in length, which was presented to Mr. Bennett, the owner of the property.

Burial No. 12, closely flexed on the right. Except on part of the trunk, the reddened clay was absent from this burial.

Burial No. 13, adolescent extended on the back.

Burial No. 14, closely flexed face down, the knees to the left.

Burial No. 15, closely flexed, face down.

Burial No. 16, an aboriginal disturbance having near it a flint knife with both ends missing, the remainder being 8 inches in length, and an undecorated vessel of coarse ware, badly crushed.

Fig. 72.—Pipe of claystone. With Burial No. 17. Bennett Place, Tenn. (Full size.)

Burial No. 17, a deposit of unburnt bones in no order. Near these was a small pipe of claystone (Fig. 72), a carbonized coating of material in the bowl giving evidence of former use.

Burial No. 18, closely flexed on the left.

Burial No. 19, a disturbance.

Burial No. 20, a deposit of unburnt bones or a disturbance, having two skulls, etc. Nearby was a pointed implement of bone.

Burial No. 21, closely flexed on the right.

Burial No. 22, closely flexed on the right. Near the feet was an ornament of charred wood which had been copper-coated, containing, in a hollow space, small pebbles. Mr. Charles C. Willoughby considers ornaments of this class to be imitations of a milkweed pod (*Asclepias*), the stones representing the seeds, and fiber the fleecy material present in the pod (see page 263). In this instance no fiber was found, possibly through its having been consumed.

Burial No. 23, a skull and bones in disorder, unburnt.

Burial No. 24, somewhat similar to No. 23.

Burials Nos. 25 and 26, closely flexed on the right.

Burial No. 27, similar to Burials Nos. 23 and 24.

Burial No. 28, closely flexed on the right.

Burial No. 29, a child having four bone beads at the neck.

Burial No. 30, closely flexed on the left, having at the head a hatchet of indurated shale, 6.3 inches in length.

Burial No. 31, closely flexed on the left.

Burial No. 32, a stone grave, rude but nevertheless of the box-shaped variety, the covering slabs, which had fallen in from one side and consequently slanted downward considerably, being 4 feet below the surface. The depth to the bottom of the grave, which was a fireplace and hard, without slabs, was 5 feet. The slabs, of limestone, were two on the right side, three at the left; and the covering slabs, which were two in number, and in addition a fragment on the lower part of the grave. At the head was a single slab, but none was present at the foot of the grave, for a cause that later will be apparent. Outside measurement, the grave was 3 feet 10 inches in length and about 2 feet in width. This grave is shown in Fig. 73, the water which collected around it being apparent in the illustration.

Fig. 73.—Burial No. 32. Rude stone box-grave, 3 feet 10 inches, by 2 feet, which contained the skeleton of a child. The depth at which the grave was in the mound caused water to collect, which is seen in the illustration. Bennett Place, Tenn.

2

1

1 AND 2. MOUND ON THE BENNETT PLACE, VESSELS OF EARTHENWARE. (FULL SIZE)

Within the grave was the unburnt skeleton of a child 8 or 9 years of age, extended on the back, the right arm and forearm being alongside the body, the left forearm across the trunk.

Between the top of the skull and the slab at the head of the grave was a space 9.5 inches in length in which was a bowl about 6.8 inches in diameter, resting upright on a rude undecorated pot. In the bowl was a spoon carved from a musselshell, which rested on another. In the spoon were four barrel-shaped beads of shell, each about .5 inch in length. The space to be occupied by the vessel presumably had not been taken into account when the grave was constructed, consequently the legs of the skeleton projected beyond the foot of the grave; hence the absence of the foot-stone.

This bowl, shown in Plate VIII, Fig. 1, is of special interest in that it has had a striking design painted in red on a background of yellow slip, the nature of the design differing entirely from anything found or heard of by us along Tennessee river except between the Bennett Place and Citico creek, about thirty miles farther up, where fragments of vessels of this kind were found, as was also the case at the White Place, an intermediate point. We have been unable to learn, though the foremost authorities have been consulted, that designs of the kind on this vessel and on the other bowl from this mound have been discovered elsewhere in the State of Tennessee. Evidently vessels of this kind belonged to a culture local and restricted in area. The designs shown in the illustration appear three times on the vessel. The white evident on the vessel in places is not, we think, due to color applied by the aborigines, but possibly resulted from exposure to heat, though not at the time of the fire ceremony in this mound.

Burial No. 33, closely flexed on the right, having below it a bone implement badly burnt.

Burial No. 34, closely flexed on the left.

Burial No. 35, partly flexed to the right, having a flint knife, pointed, 7.25 inches in length.

Burial No. 36, partly flexed to the left.

Burial No. 37, extended on the back.

Burial No. 38, partly flexed to the left.

Burial No. 39, partly flexed to the right. The upper part of this skeleton was burnt, the extremities projecting beyond the clay. At the outer side of the knees was a hatchet of silicious material, 4.25 inches in length. Lying transversely on charred matting, under the right humerus, just above the elbow, the edge away from the body, was a celt of indurated shale, 5.75 inches in length. A small, undecorated vessel in fragments was on the upper part of the thorax. At the right side of the neck was a pin of bone having a blunt point, a hair-pin, perhaps, under an implement of indurated shale, 4.5 inches long, having a blunt edge. At the neck of the burial were a few discoidal shell beads.

Burials Nos. 40 and 41, partly flexed on the right.

Burial No. 42, adolescent, partly flexed on the left.

Burial No. 43, partly flexed to the right, the right humerus almost at a right angle from the trunk, the forearm closely flexed on it; the left humerus along the thorax, the forearm diagonally upward and across the trunk.

Burial No. 44, extended on the back, the upper arms along the body, the right forearm diagonally across the trunk, the left straight down. At the neck were shell beads.

Burial No. 45, at full length, face down, a post-hole having removed the skull, the legs cut through by a trench from an upper layer in the mound. The upper arms were parallel to the trunk, the right forearm flexed upward across and under the thorax, the left closely flexed against the humerus.

Burial No. 46, partly flexed on the left.

Burial No. 47, trunk face down, the legs partly flexed to the left, the right humerus extending almost at a right angle to the body, the forearm flexed to an acute angle with the upper arm, the left humerus and forearm being similarly disposed.

Burial No. 48, disturbed bones of an adolescent. Shell beads and two small, flint arrowpoints were near the skull.

Burial No. 49, a mass of disarticulated bones together, having four skulls, other scattered bones being nearby. Having been placed in a space between two deposits of red clay over burials, none of these bones showed marks of fire. Over part of this deposit of unburnt bones were grouped four masses of unburnt limestone, the largest 7.5 inches by 6.5 inches.

Burial No. 50, partly flexed on the left. At the thorax were two pebbles; shell beads were at the neck.

Burial No. 51, the upper part of the trunk face down, the legs partly flexed to the right, the right humerus parallel to the trunk, the forearm closely flexed against it, the left humerus at an angle of forty-five degrees from the body, the forearm flexed under the trunk. At the right elbow was a small shell disc, imperforate. At the neck were many shell beads and remains of a long mussel-shell which may have been a kind of pendant.

Burial No. 52, closely flexed on the left. In the space between the thighs and the body was a celt of indurated shale, 7.1 inches in length. The handle of this celt was in place, but was so badly charred that it fell to fragments on removal. This burial lay, in part at least, on a kind of mat made of reeds or of small canes placed parallel in contact and joined together with cords crossing at right angles.

Burial No. 53, closely flexed to the left.

Burial No. 54, partly flexed on the right, both humeri somewhat extended in front of the trunk, with the forearms partly flexed on them. At the neck were shell beads, near which were three arrowheads. All the projectile points from this mound are of medium size or small, triangular, and delicately made.

Burial No. 55, closely flexed on the right.

Burials Nos. 56, 57, 58, all disturbances, having been put in disorder, to

some extent, by an aboriginal trench. At the neck of Burial No. 56 were shell beads. Burial No. 57 had, at the neck, a hatchet of indurated shale, 6.1 inches long, having a handle badly charred which extended under the upper part of the thorax.

Burial No. 59, extended on the back. Resting on the pelvis was a vessel of coarse ware having a rude head, in fragments, which has been restored and proves to be a bottle of about the same kind as that found with Burial No. 77, this mound, shown in Fig. 76. The bottle from this burial has been sent to the United States National Museum (Accession 58442).

Burial No. 60, a disturbance.

Burial No. 61, extended on the back. Under this burial had been a mat such as has been described in connection with other burials in the mound.

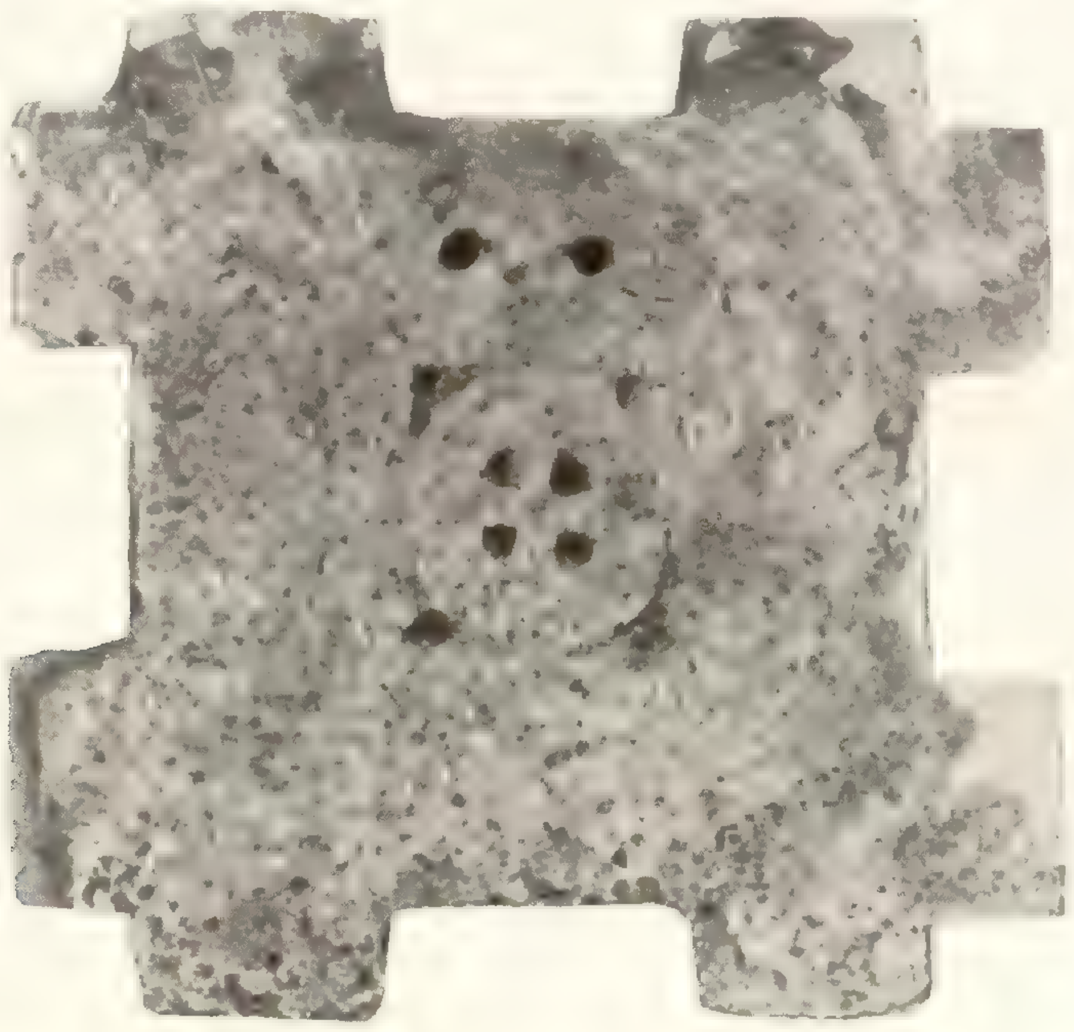

FIG. 74.—Gorget of shell. With Burial No. 75. Bennett Place, Tenn. (About full size.)

Burials Nos. 62 and 63, children, the small skeletons considerably burnt.

Burial No. 64, partly flexed on the left.

Burial No. 65, partly flexed on the left. On the chest had been an ornament of sheet-copper reduced to small fragments when found.

Burial No. 66, partly flexed on the right, the humeri along the body, the forearms flexed against them. At the neck were shell beads; under the skull was a handsome knife of flint, more than 9.5 inches in length, having a fine point at one end, neatly rounded at the other.

Burials Nos. 67 and 68, partly flexed on the right, Burial No. 68 having shell beads at the neck.

Burial No. 69, partly flexed to the right.

Burial No. 70, partly flexed on the right.

Burial No. 71, closely flexed on the right.

Burial No. 72, partly flexed on the left.

Burial No. 73, extended on the back.

Burial No. 74, at full length, face down.

Burial No. 75, the skeleton of a child about two years of age, lay in a grave, showing no mark of fire. At the neck were five globular beads of shell to which had been attached a shell gorget of unusual shape (Fig. 74). Shell beads also were at the ankles, making 103 in all for this burial. At the feet was a painted bowl about 5.5 inches in diameter (Plate VIII, Fig. 2) of the fine ware noted in

Fig. 75.—Design of decoration on vessel with Burial No. 75. (Half-size.)

connection with the bowl from the stone grave in this mound. This bowl, standing upright, had upon it a pot of the usual coarse ware, having two loop-handles and containing a carved spoon of shell.

The design on the bowl, part of which suggests the swastika, is shown in diagram (Fig. 75), the painted portions represented by cross-hatch lines. This design is in part similar to one on a bowl from New Mexico, described by Doctor Fewkes,[1] and incidentally we would call attention to a dancing female figure on a vessel described in the same work[2] which greatly resembles one on a bowl found

[1] J. Walter Fewkes, "Archæology of the Lower Mimbres Valley," Smithsonian Misc. Coll., Vol. LXIII, No. 10, Fig. 31.

[2] Plate I, No. 2.

by us in the Rose Mound[1] on St. Francis River, Ark. The shade of the pigment on this bowl from the Bennett mound differs from that usually found on aboriginal ware decorated in red, being richer and resembling closely the color of the material found by us with certain burials along Red river, in Arkansas, that proved to be red oxide of iron which had been subjected to heat.

Burial No. 76, partly flexed to the left.

FIG. 76.—Vessel of earthenware. With Burial No. 77. Bennett Place, Tenn. (Height 13.75 inches.)

Burial No. 77, closely flexed on the right. At the head was a bottle in many fragments which have been put together (Fig. 76), the head probably representing that of some animal or perhaps a human head. An attempt has been made to indicate the ears. At the neck were a few shell beads.

Burial No. 78, closely flexed on the left. About one foot from this burial lay a beautiful ceremonial axe of indurated shale, 8.9 inches in length, width of blade 2.9 inches, width of opposite end 1.1 inch, flaring at the cutting edge as

[1] "Antiquities of the St. Francis River," etc., Journ. Acad. Nat. Sci. Phila., Vol. XIV, Plate XII.

do many copper axes (Fig. 77). Axes of this kind in stone are uncommon, but are occasionally met. This one, however, is figured on a much larger scale than has been accorded before to this class of axes. With the axe were three arrowheads of flint.

Burial No. 79, partly flexed on the right. This burial had but a thin deposit of reddened clay above it, and in consequence was inconsiderably burnt.

Burial No. 80, extended on the back.

FIG. 77.—Ceremonial axe. With Burial No. 78. Bennett Place, Tenn. (Full size.)

Burial No. 81, partly flexed to the right. This skeleton lay beyond the red-clay deposit and was unburnt.

Burial No. 82, extended on the back.

Burial No. 83, at full length, face down. Shell beads were at the pelvis. A remarkable feature in connection with this burial was that the brain, much reduced in size but retaining its shape, was found in place in the skull, which lay in fragments.

This interesting specimen was given by us to the Army Medical Museum, Washington, D. C. A letter expressing our willingness to publish a communication in regard to it remains unacknowledged.

Burials Nos. 84 and 85, children, the latter skeleton having a large mussel-shell at the head, burnt and broken.

Burial No. 86, a skull and a femur, unburnt, lying beneath a mass of sandstone.

Burial No. 87, extended on the back, the arms folded on the chest, the legs crossed near the ankles. This skeleton lay on the red deposit and showed no mark of fire. At the neck were 166 pearls pierced for use as beads. Shell beads

were at the thorax and at the knees. Three vessels of coarse ware, undecorated, crushed, had been in line parallel to the right thigh.

Burial No. 88, adolescent, extended on the back. At the left thigh were a celt of indurated shale, 3.7 inches long, with double cutting edge, and a coarse, undecorated vessel badly crushed.

Burial No. 89, partly flexed to the left. Under the knees was a coarse, undecorated bowl, and a vessel, also of inferior ware, filled with carbonized organic matter. Near the skull was a small, earthenware pipe (Fig. 78) which was somewhat broken by a blow from a trowel but has since been restored. Near this burial was an object of wood which had been copper-coated.

Fig. 78.—Pipe of earthenware. With Burial No. 89. Bennett Place, Tenn. (About full size.)

Burial No. 90. Rising water on the last day of our investigation prevented determination as to the form of this burial.

Burial No. 91, adolescent, slightly flexed to the left. *Olivella* shells, pierced for suspension, lay with this burial.

Burial No. 92, disturbance.

Found apart from bones or near scattered ones were three celts of moderate size, found separately, a discoidal of quartz (not bicave), 4 inches in diameter; a ceremonial axe of the hoe-shaped variety, of indurated shale, 5.8 inches long; and two small knives of flint. The ceremonial axe and the knives lay together, just below the surface, entirely away from burials and probably constituted a cache. Holmes,[1] speaking of these hoe-shaped axes, says: 'A suggestion of cultural connection with South America is found in the frequent occurrence in this [Florida] and other Gulf states of a perforated hoe-shaped stone implement which corresponds closely with a type of ax prevalent in South America. It is believed to have had only a ceremonial use north of the Gulf."

Other objects found were: most of a small, shell gorget having excisions to form a cross of the cardinal directions; two large musselshells, each to receive a handle, fitting them for use as hoes; an imperforate disk of shell 1.5 inch in diameter; a rude, undecorated vessel of earthenware; part of a coarse vessel having had an animal's head as decoration; the penis-bone of a raccoon, the end sharpened for use as an implement; jaw of a black bear.

Mound B.

Mound B, a few yards NNE. from Mound A, had an area of about 50 feet square. Its maximum height above the water was about one foot, and holes a greater depth than that became quickly filled.

[1] William H. Holmes, "Areas of American Culture Characterization Tentatively Outlined as an Aid in the Study of American Antiquities," American Anthropologist, July–Sept., 1914, p. 423.

Mound C.

A short distance N. by W. from Mound A was Mound C, on a very irregular area of about 5,400 square yards. The mound, having a circular base, was 5 feet in height and had a diameter of 50 feet. An excavation 12 feet square was sunk until water was reached, passing through dark soil containing organic matter but having no trace of burials. The base of the excavation was carefully prodded for stone graves, but without success.

A short distance NNE. from mound A is an area above water, somewhat greater in extent than is that upon which was Mound C The area in question, which had a barn upon it before the construction of the dam, had no elevation which was distinctly a mound. At its highest part, however, several feet above water-level, trial-holes showed no sign of aboriginal occupancy and soon reached undisturbed subsoil.

Mound and Dwelling-site on the White Place, Marion County.

In full view from the river, on property of Mr. Taylor White, resident upon it, was a mound 7 feet 4 inches in height and 52 feet by 35 feet in diameter of base, which was said never to have been dug into or plowed over. The dwelling-site lies between the mound and the river.

The mound, which would have been a symmetrical, blunt cone had not the marginal parts on two opposite sides been plowed away, was dug by us to the extent of an excavation 14 feet square, sunk centrally and including a considerable portion of the slope as well as all the summit, there having been practically no level space on the top.

What was seemingly a base was reached at a depth between 6.5 and 7 feet, the clay at that level having been of a lighter shade than was that of which the mound was composed. Masses of sandstone, some about double the size of a human head, others of greater or less dimensions, were scattered here and there in the mound with no arrangement.

About 9 inches from the summit was a human skull in fragments, much decayed.

Four feet below the top of the mound, approximately, but somewhat less from the sloping surface under which this burial lay, were traces of human remains, indicating a burial partly flexed, the knees to the right. This burial was represented by traces of a skull, then a space where ribs, vertebræ, and arms had been, and then traces of femora and tibiæ.

In a grave 4 feet 7 inches by 1 foot 10 inches, extending about 1 foot below the base of the mound and very clearly defined in the light-yellow clay, was a skeleton at a total depth of about 8 feet, considerably decayed and fragmentary, but in much better condition than was the one above it in the mound, lying closely flexed to the right, the head directed SSW. Both humeri were parallel to the body, the right forearm flexed closely against the upper arm, the left forearm across the body. This burial lay at the end of our excavation.

About central as to the base and extending 1 foot 4 inches into the yellow clay below it, was a grave in the form of a wide ellipse, 6 feet by 4 feet, approximately, containing a much-decayed skeleton partly flexed to the left, the head NNE., the whole burial being indicated simply by small fragments. The

FIG. 79.—Grave in the center of the base of the mound, 6 feet by 4 feet, having an arrangement of stones placed over a skeleton, the crushed skull of which is visible in the illustration. White Place, Tenn.

skeleton had been placed immediately on the base of the grave, and directly on the skeleton and around it had been arranged irregularly twenty-six blocks of sandstone as shown in Fig. 79, a space, however, having been left uncovered

over and around the skull, which was in fragments when found, as shown in the illustration. No artifacts of any kind lay with this burial.

The dwelling-site, of limited extent, but which perhaps had been in part submerged when the dam caused the rise in the river at this place, was of sandy loam and was known in the vicinity as a place where bones had been exposed by plowing.

Fifty-one trial-holes, however, showed that burials were widely apart in it, only four being found, as follows: one partly flexed to the right, which had been somewhat disturbed by cultivation; another lying with the trunk face down, the lower extremities closely flexed to the right, the upper arms parallel to the trunk, having the forearms flexed against them, this burial being in a pit 15 inches below undisturbed ground which, at that spot, was 32 inches deep; a third burial, 27 inches down, being a skull and thoracic parts with the upper-arms, the rest of the skeleton having been cut away by a pit which contained no burial; and, lastly, a skeleton closely flexed on the right, the head ESE., 3.5 feet deep, the last 18 inches of which being the depth of a grave extending into the sand underlying the field.

Fig. 80.—Object of claystone. White Place, Tenn. (Full size.)

Several arrowheads or knives, of flint, were found in the soil apart from burials, as was an interesting object of claystone, shown in Fig. 80, having a part missing when discovered, which has since been restored, none of this part, however, showing in the illustration.

Williams Island, Hamilton County.

Williams Island, which belongs to Mr. Walter Hampton, of North Chattanooga, to whom we are indebted for permission to investigate a number of interesting sites on Tennessee river, is about five miles by water below Chattanooga.

The island, which has a history, both local and otherwise, of aboriginal relics discovered there, is about two miles in length and one-half mile in maximum width.

Its principal aboriginal site is about half-way down the island, on the eastern side, bordering the water, and is a small field of rich, dark soil having some aboriginal debris scattered over the surface. In this field, near the water's edge, was a slight elevation in which, we were told, the principal digging had been done by those who had visited Williams Island in search of relics.

Eight trial-holes were sunk by us in this elevation to underlying, undisturbed, yellow, sandy soil, which was reached at a depth of from 2 to 3 feet without

encountering other than fragmentary human remains, save in one instance (Burial No. 1) where a grave continued into the subsoil, containing a skeleton partly flexed to the right, the head S., at a depth of 5 feet 2 inches. Near the skull was a rude flint knife.

Another low rise a short distance in a southerly direction from the first, and ground adjoining buildings near the rise, contained ten burials, full details as to which we give, not because anything of marked interest was found with them, but for the reason that Williams Island is so famous a spot for the discovery of aboriginal remains.

Burial No. 2, the trunk prone, the legs partly flexed to the right, the humeri parallel to the body, the right forearm flexed against the upper arm, the left forearm in line with the upper arm, the head N. by E., depth 34 inches.

Burial No. 3, extended on the back, the head directed N. by E., depth 22 inches. At the outer side of the left thigh were two small knives, one a chipped pebble, the other a flake of flint; a shell ear-plug; a small shell disc; a few beads made by perforating marine shells (*Marginella apicina*); two bone beads; two small, tubular beads of copper—a strange collection strangely placed unless we consider them to have lain together in a bag.

Burial No. 4, aboriginal disturbance.

Burial No. 5, aboriginal disturbance including three skulls.

Burial No. 6, a child, 20 inches down.

Burial No. 7, adolescent, extended on the back, the head W., lay at a depth of 2 feet, in a grave. Above the skeleton and for some distance up in the grave were materials from a fireplace, including clay colored red by heat, ashes, and charcoal. In places burning wood had been in direct contact with the skeleton, as the face, the front of the thorax, and the front of the right knee, on all of which lay charcoal, were charred, while the under part showed no mark of fire.

Burial No. 8, adolescent, extended on the back, the head W., depth 18 inches.

Burial No. 9, at full length on the back, the head N., depth 32 inches.

Burial No. 10, a child lying at full length on the back, the head S., 22 inches down. A pot having two loop handles, and small, coarse, lined decoration below the rim, lay at the left of the skull.

Burial No. 11, extended on the back, the head directed toward S., depth 3 feet. Between the shin-bones was a small, cutting implement of chipped flint, and a similar one lay at the left of the skull. Seventy-two shell beads were at the neck.

In the soil, apart from human remains, were a considerable number of pottery disks, found separately. One of sandstone has incised on one side a cross and on the other side a small central depression with six about equidistant lines radiating from it.

There were also found in the dark earth a number of flint arrowheads, gracefully made, some small but not more so than are present in many aboriginal sites along Tennessee river; a large part of a bowl having knobs around the margin; a leaf-shaped implement of flint, 3 inches in length; jaw of a black bear.

Here ends the description of the sites into which, it is believed, relic-hunters have dug before, the remaining two sites having been, we are confident, undisturbed before our visit.

About one-quarter mile above the lower end of the island is a restricted area of dark soil having fragments of shell and bits of flint on the surface. No rise was apparent.

Thirteen trial-holes came upon two burials, as follows:

Burial No. 12, closely flexed on the right, the head NNE., depth 9 inches.

Burial No. 13, partly flexed to the left, the upper arms parallel to the trunk, the right forearm across the body, the left forearm flexed against the humerus.

Bordering the water's edge, on the eastern side of the island and one-half mile, approximately, from the upper end of it, is an aboriginal dwelling-site of considerable extent, as evidenced by the character of the soil and the presence on the surface of fragments of shell, of stone, and of pottery to a limited extent, one bit of the latter bearing a design conferred with a stamp.

Considerable digging in this place, where no rise was apparent above the general level, yielded two burials:

Burial No. 14, closely flexed on the right, the head SW., lay in a grave more than 4 feet deep.

Burial No. 15, 3 feet down, partly flexed to the right, the upper arms along the body, the right forearm closely flexed on the humerus, the left forearm in line with the upper arm. The skull, which was directed W. by N., was saved in excellent condition. A piercing implement of bone lay at the inner side of the left elbow. This burial was in material similar to the surrounding soil. No limits to the grave could be determined.

Here ended our investigation of Williams Island, as no other aboriginal sites were apparent. It would not have surprised us to have found no burials on this island, considering the cultivation and the amount of digging that is said to have taken place there, but to find so few and comparatively uninteresting objects interred with the dead at this well-known place was entirely unexpected.

We may not leave Williams Island without reference to the minute arrow-points alleged to have been found there and along Moccasin Bend, nearby.

These minute points, some hardly more than one-sixteenth inch in length, are well known to archæologists. They have been described by Professor Moorehead[1] who, however, never having visited the locality, of course had to rely on statements made to him. Professor Moorehead says:

"One of the strangest things in Middle South archæology is the high art exhibited in the exceedingly small points found at Moccasin Bend, Tennessee river. . . .

"Col. Young [Col. Bennett H. Young, of Louisville, Ky.] has the largest

[1] "Prehistoric Implements," p. 168 *et seq.*

collection of these small Tennessee arrow-points in this country. Not more than 500 have been found, and he has in his cabinet a collection of 350. They have attracted attention and created much interest wherever exhibited and for a long time many people were disposed to believe they were counterfeit productions of the present time. In order to satisfy himself of the absolute authenticity and genuineness of these arrow-points, Col. Young, on two occasions visited the place where they were found. He crawled on his hands and knees over the sand, sifting it, and after three days' hard work secured two very fine specimens and found hundreds of broken pieces, showing that these arrowheads were made at Moccasin Point [Bend] in large numbers. The spawls from the agate and flint are still found in large quantities; but whatever race made them had evidently attained the highest possible skill and perfection in the manufacture of arrowheads and obtained a knowledge which had not been communicated to other tribes, for in the same locality, within a hundred miles of this point, no similar articles have ever been found."

Descriptive of the illustrations of some minute arrowpoints and other small points of remarkable appearance, Professor Moorehead quotes Colonel Young's letters as follows:

"The most unusual of the objects on this card is the flint fish-hook, which has a well defined barb. The small drills at the top of the plate and one at the bottom are very unusual, some have square, some have rounded heads. All of these came from Williams Island in the Tennessee river, at Moccasin Bend. They are not only of splendid material—many of them being of agate—but the points are very sharp, the serration is regular and even, and the shoulders to the points are not only very much prolonged but the points are fine as a needle. These were evidently made in modern times. It is impossible to conceive of such serrations on arrowheads of such small size without the use of metal implements of some kind, either for the purpose of sawing the material from which these points were made or for the purpose of cutting them."

Colonel Young courteously replied to inquiries from our Academy in relation to his connection with the minute arrowpoints, stating, among other things:

"I secured nearly all these small arrowpoints. I first got them from a dealer in Cincinnati—long since dead—who had a sort of trust with the person who found them in Moccasin Bend. These points were so remarkable that their genuineness was questioned, and some ten or twelve years ago I went to Chattanooga and stayed three days. I got numerous perfect ones. The way I secured them was to take the sand which washes down from the first and second dams of the Tennessee river and at the deposit where there would be a pool of water caused by the flow from the first and second dams we would sift the sand with a very fine sifter and in this way we got not only the perfect but the imperfect arrowpoints. I must have gotten a thousand broken ones, some fairly good even though not perfect."

The facts as to these minute points (so far as it is advisable to publish them

in the JOURNAL), determined by us after strenuous search on the surface and by digging, and by repeated interviews with persons in Chattanooga informed on the subject, during a visit of six weeks to that city and its vicinity, including Williams Island and Moccasin Bend, and later by correspondence with experts in various parts of the country, are as follows:

1. None of these points was found by us on the surface or in graves. Had the points been made near the river-bank and then some washed to places along the stream, one certainly would expect others to have been carried inland and left on the surface or deposited with burials.

2. No one living on Williams Island or along Moccasin Bend seems to know anything of the presence of these minute points there, either now or in the past; and citizens of Chattanooga, well informed as to the matter, have sought them in vain and know of no proof of their actual discovery, and from various details connected with these arrowpoints are inclined to consider them fraudulent.

3. Years ago these arrowheads were put on the market in great numbers[1] by a citizen of Chattanooga, a dealer in curiosities and in relics purporting to come from the battlefields around Chattanooga, who later obtained a distributing agent for the arrowheads in Cincinnati, to widen the market for them.

4. Colonel Young, of whose good faith in this matter there is no question, when he obtained the minute arrowpoints in place did so under the guidance of this original vendor. Williams Island is but a short distance from Chattanooga.

5. Though the original vendor, it is said, used to state that some of the minute arrowheads had been found on Williams Island by boys, there is no proof of any of these small arrowpoints having come into the possession of any-one except through the original vendor or through those in his company when the alleged discovery was made.

6. In the foregoing statement no consideration has been accorded to the minute arrowpoints on sale until recently or to the present time by a well-known fakir in Virginia and by parties in the western Tennessee and Kentucky region.

MOUNDS ON THE CARTER FARM, HAMILTON COUNTY.

The Carter Farm, opposite Williams Island, belonging to the Chattanooga Estates Company, C. E. James, Esq., President, has three mounds on it all in sight from one another and from the river bank.

MOUND A.

Mound A, the most westerly of the three, is in a cultivated field and evidently has been greatly spread by the plow. Its present height is slightly less than 4 feet; its diameter, 60 feet. Eight trial-holes, which included most of the mound other than the marginal parts, came upon, in one instance, a double burial in the center of the base of the mound, which seemed to have been placed

[1] We know of the present whereabouts of more than six hundred.

on the original surface soil, which was about 6 inches in thickness and rested upon undisturbed yellow clay.

The grave had been filled in for a depth of about one foot with musselshells, having a small admixture of clay. From this depth upward the proportion of shells mingled with the soil became gradually smaller until at the top scattered shells were found only here and there. Elsewhere in the mound no such deposit of shells was encountered, and it was evident they had been brought to place over the burials in this grave. At the bottom of the grave lay the skeleton of an adult partly flexed to the right, probably a male, judging from the size of the long-bones, the skull being badly crushed.

With its skull resting on the thorax of the adult skeleton were the bones of a child lying partly flexed on its left side, its pelvis extending somewhat below that of the other skeletal parts. Beads made from *Olivella* shells were at the neck and waist of the child's skeleton. The left tibia of the adult skeleton lay in its proper position in respect to its femur, with the exception that it was reversed. Probably in conveying the skeleton to the mound the tibia had become detached, and when the bone was replaced by the aborigines (which they did not always take the trouble to do) it had been reversed as described.

Mound B.

Mound B, the middle mound of the three, has a height of 4.5 feet, measured from the outside. Its diameters are 60 feet and 35 feet. The marginal parts of the mound had been plowed away to some extent on two opposite sides, which accounts, in part at least, for the unequal diameters. Otherwise, the mound showed no sign of former cultivation. Previous diggers, however, had left a hole near the center, but not sufficient in extent to interfere with serious investigation.

An excavation 12 feet square was sunk by us centrally in the mound to its base, or at least to what seemed the base indistinctly marked, which was reached at a depth of 6 feet. The mound was of perfectly dry clay and work in it was carried on with the aid of picks.

Burial No. 1 lay at a depth of 2 feet 2 inches and consisted of the lower extremities of an adult, flexed. There was no sign of previous digging near these bones, and possibly the remainder of the skeleton had decayed away, or, what we consider more likely, the burial had been originally a part of a skeleton only, such as we found occasionally in mounds farther up the river.

Burial No. 2, partly flexed to the right, the head NW., depth 3 feet 10 inches. The bones were badly decayed. About one foot from the left shoulder were two celts of indurated shale, 7 inches and 5.5 inches long, respectively. With these were the remains of a columella of a sea-shell. Over this burial was a deposit of musselshells mixed with the clay of the mound.

Burial No. 3, partly flexed on the left, the head directed ENE., depth 5 feet. Here again a deposit of river shells lay just above the burial. A similar deposit

in another part of the excavation was not visibly associated with skeletal remains, though possibly decay might account for their absence. No other shell deposits were found in the excavation.

Burial No. 4, a pit extending about 1 foot 3 inches below the base of the mound, contained fragments and traces of bones which indicated that the skeleton had been partly flexed on the right, the head pointing SSW.

Mound C.

This mound was 45 feet distant from Mound B, and, like it, very dry and hard. Its height was 6.5 feet, outside measurement; the diameters were 58 feet by 36 feet. Here, too, the marginal parts had been plowed away on two opposite sides. A trench about 4 feet wide had been carried in by diggers previous to our coming, along the base to about its center.

An excavation 12 feet square sunk by us through the middle of this mound included part of this trench, and at a depth of 7.5 feet came to what seemed to be undisturbed ground in which no fragments of stone or other indication of the presence of aboriginal products were noted. No shell deposit was encountered in any part of the excavation. After reaching the base, a hole about 2 feet square was carried 18 inches deeper without passing through other than seemingly undisturbed ground.

With exception of traces of a skull found at a depth of 5.5 feet, no signs of human remains were met by us in this mound, though it is not unlikely that other burials formerly present in the excavated part had decayed away.

At Carter Farm, which, as we have said, is opposite Williams Island, were a number of places where the surface soil had been washed and furrowed by rain and where quantities of small chips of flint were present. No arrowheads, however, were found, though it would be at a place such as this that the minute points reported discovered in this vicinity might be expected.

Mound and Dwelling-site at Williams Island Ferry, Hamilton County.

The landing place of a ferry from the mainland to Williams Island is on property belonging to Mr. Walter Hampton, of North Chattanooga, whose courtesy to the Academy we have had occasion to note in connection with Williams Island.

About one hundred yards easterly from the eastern end of Williams Island Ferry, in a cultivated field, is a mound slightly more than 2 feet in height and about 50 feet in diameter, whose shape has probably been altered by long cultivation.

Eight trial-holes, which covered fairly what had been the original mound, came upon a skeleton (Burial No. 1) lying at full length on the back at a depth of 2 feet, in the base of the mound. Near the left shoulder was an arrowhead of flint.

About 50 yards in a northerly direction from the mound, in the same field,

was a low elevation having considerable debris on the surface. Five skeletons were uncovered as a result of considerable digging.

Burial No. 2, closely flexed on the right, the upper arms parallel to the body, having the forearms closely flexed against them, had two slabs of limestone over the feet. This burial was 8 inches below the surface.

Burial No. 3, adolescent, partly flexed to the left, lay in a grave 18 inches below the surface, one foot of the grave extending into undisturbed yellow clay which afforded a marked contrast to the dark soil with which the grave was filled. Beads made by piercing sea-shells (*Olivella*) were around the waist, along both forearms, at the inner side of the right upper arm, at the front of the upper part of the right side of the thorax, and at the back of the right shoulder-blade, 888 in all. At the right elbow, encircling the forearm, were nine beads from 1.1 inch to 1.6 inch in length, made from columellæ of marine shells.

Burial No. 4, at full length on the back, depth one foot.

Burials Nos. 5 and 6, children lying side by side, one foot down.

Dwelling-site and Mounds on the Hampton Place, Hamilton County.

On the left-hand side of the river, going up, in sight from the lower part of the city of Chattanooga, on Moccasin Bend, famed for the discovery there of aboriginal remains, is one of the numerous properties so courteously placed by Mr. Walter Hampton, of North Chattanooga, Tenn., at the disposal of the Academy for investigation.

Over much of this estate, in places, lies debris left by aboriginal occupancy, and circumstantial accounts from various sources, of the finding of many relics on the place, superficially and by digging, are current.

Wires carying power to the city of Chattanooga and beyond from the electrical plant at Hale's Bar dam cross Tennessee river at the lower end of this estate. About two hundred yards ESE. from the last iron structure supporting the wires on the side of the river on which the estate is, we noticed ground slightly higher than was most of the cultivated land surrounding it, and were told by Mr. Haney, the tenant on the lower part of the Hampton Place, that human bones had been dug from this place in the past.

Extensive digging by us in this higher ground strongly indicated that burials in it had been confined to a restricted area of irregular outline, 34 feet long and 19 feet and 25 feet wide at the two ends, respectively.

This burial place was completely dug through by us and proved to be loamy sand extending down about 4 feet to underlying clay. In it were encountered thirty-one burials (excluding several disturbed by previous digging), all in graves or in grave-pits, the graves being such as we had been accustomed to along the river, containing flexed burials and burials at length.

The grave-pits, however, were circular, about 2 feet in diameter, and were deeper than the graves, sometimes extending a foot or more into the underlying

clay. In these grave-pits burials, through lack of space, had been placed more or less vertically, as will be described in due course.

Nearly every burial in this cemetery, but not all, had been interred in connection with the use of ceremonial fire, the graves and pits having been first filled and then above there had been placed an extensive layer of clay, greater in extent than the area of the grave. This clay, red from the effect of fire, probably had been placed above the graves while hot.[1] In several instances imprints of matting, etc., were found on these masses of clay, which imprints probably denote that a wigwam had been burnt ceremonially.

That this red clay did not come from fireplaces made directly over the graves is clearly proved by the fact that the material of this site was of loamy sand, as stated, and could not have burnt into lumps such as were found, through the effect of any degree of heat. Evidently the burnt clay had been brought and deposited. Furthermore, no ashes or charcoal were with the layers of clay, nor was the sand below them affected by heat to any marked extent. Clay for wattle-and-daub buildings, which presumably had been burnt ceremonially at the time of these burials, could, however, easily have been obtained from the underlying clay or from rolling ground not more than one hundred yards distant.

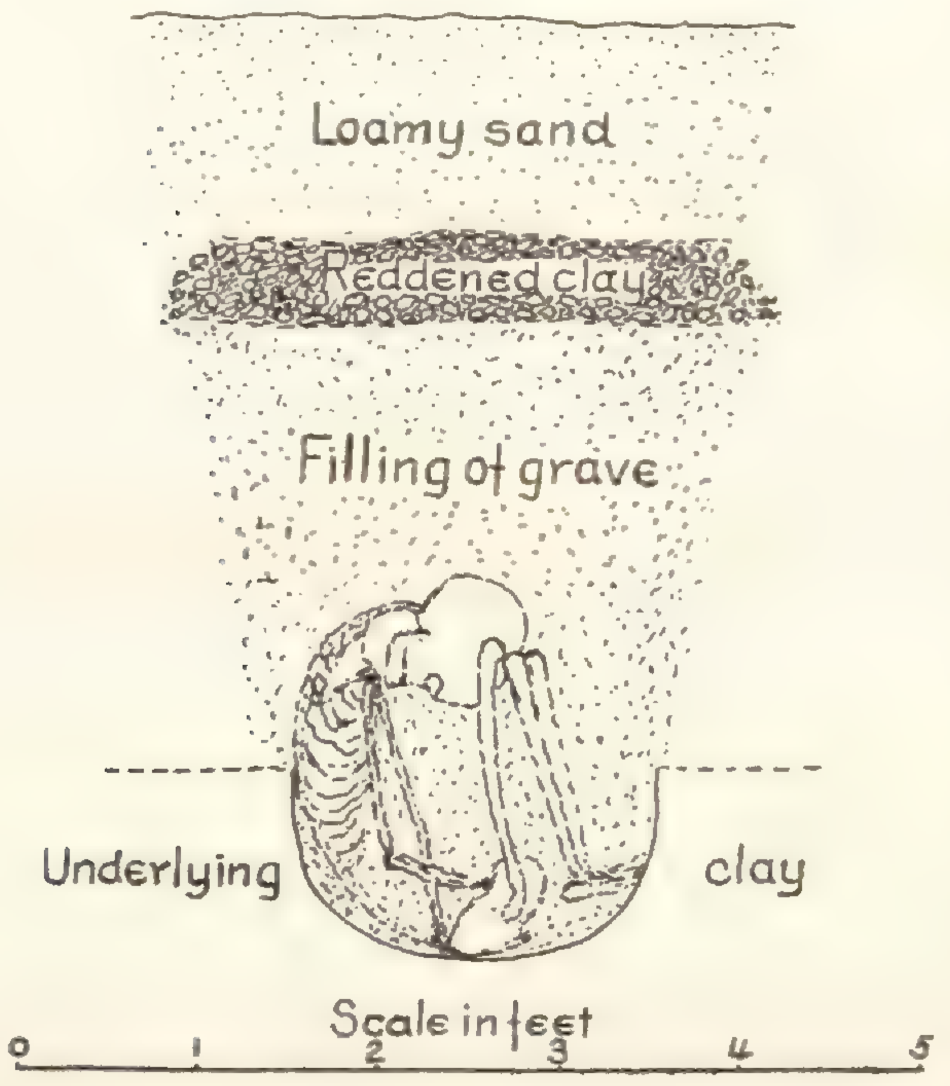

Fig. 81.—A typical burial. Hampton Place, Tenn.

These layers of reddened clay, however, were not on the present surface of the ground, but at some depth beneath it. Presumably, after the burials had been made and the ceremonial rites performed at this place, the occupancy of the site continued with a consequent increase in its height.

A typical example of the grave-pits, but by no means applying exactly to all of them, as they varied considerably in detail, is as follows (see section, Fig. 81):

Loamy sand on top, 14 inches.

Reddened clay, 6 inches.

Material filling that part of the grave-pit in the made-ground, 30 inches.

The same material continuing into underlying clay, 12 inches.

Depth from surface, 5 feet 2 inches.

Here follow details of the burials:

Burial No. 1, partly flexed on the right, 46 inches to the upper surface of the bones. A flint knife or arrowhead lay in the soil nearby.

[1] See our account of the Bennett Place, pages 338–352 of this report.

Burial No. 2, partly flexed to the left, depth 49 inches. A pot of coarse ware with rude decoration of elementary design lay near the skull.

Burial No. 3, depth 4 feet, lay at length, face down as far as the knees, the legs being closely flexed against the thighs, the forearms and arms parallel to the body.

Burial No. 4, a skeleton in a grave-pit 52 inches deep, closely flexed, the pelvis at the bottom of the pit, the body bent above it so that the head lay over and upon the pelvis. The thighs were in an almost vertical position, the legs flexed against them. The skull of this skeleton was saved.

Burial No. 5, a skeleton partly flexed to the left, there being a depth of 43 inches to the upper surface of the bones, our method of measuring such burials. The right arm and forearm were parallel to the trunk; the left humerus was against the side of the body, the forearm flexed on it. At the neck were three tubular, brass beads, much corroded, and a disc of brass (the reader will note we are describing a post-Columbia site) slightly more than 3 inches in diameter, having a central opening .8 inch across.

Burial No. 6 lay in a grave 40 inches down, the trunk on the back, the thighs vertical, at right angles to the body, the legs flexed against them. The humeri were parallel to the trunk, the forearms lying across it. Near the chin lay an iron celt 2.5 inches in length. Alongside the skull was a layer of powdered hematite, about 8 inches in diameter and 1 inch in maximum thickness, in which lay a tubular bead of brass. On the upper part of the thorax was a boss of sheet-copper about 4 inches in diameter, having a small central perforation, which evidently had been suspended by many strung glass beads which, including two tubular beads of brass, each about 1 inch in length, were at the neck. Glass beads also were at the left elbow. An arrowhead or knife lay near the right wrist, and two deposits of arrowpoints of flint, three in one deposit, two in the other, were near the pelvis. None of these points was less than an inch in length.

Burial No. 7, a child, 53 inches down.

Burial No. 8, a partial burial consisting of a skull without the lower jaw, a femur and a tibia, together, under unbroken layers.

Burial No. 9, a skeleton which Burial No. 6 had cut through, leaving bones from the pelvis up only. With this burial was a deposit of powdered hematite 11 inches by 8 inches, and 1 inch in maximum thickness, with which was a tubular bead of sheet-brass. At the side of the skull were two discs of brass, placed vertically together, while two others of the same material lay horizontally beneath the chin. Near the skull was a tubular bead of bone 1.7 inch in length, and behind the skull the remains of a large marine shell (*Cassis tuberosa*), the interior of which had been removed to form a cup.

The discs, one pair about 4.25 inches in diameter, the other pair slightly larger, all had central openings ranging between 1 inch and 1.5 inch in diameter, one of the larger discs having in addition four small perforations in a row. The skull of this skeleton was saved.

Burial No. 10, an aboriginal disturbance having part of the skull and of one shoulder cut away by the grave of Burial No. 11. This burial (No. 10) had been loosely flexed in a semireclining position. Near the head, together, were two pipes, one of claystone (Fig. 82), the other of limestone, both of an interesting and unusual form seemingly popular at this place, three of this kind having been found here. The shape, very novel, may be a highly conventionalized bird-head or animal form. An iron knife lay on the thorax and a flint arrowpoint was near the left thigh.

At some little distance from the remains, though probably placed in connection with them, was a grooved hammer of flint.

Fig. 82.—Pipe of claystone. With Burial No. 10. Hampton Place, Tenn. (About full size.)

Fig. 83.—Pipe of earthenware. With Burial No. 12. Hampton Place, Tenn. (About full size.)

Burial No. 11, at the bottom of a grave-pit slightly less than 5 feet deep, was a skeleton closely flexed in a vertical position, the knees in front of the chin, the arms along the trunk, the forearms brought forward to the outer side of the legs. Near the right elbow was a deposit of red hematite in powder, about 6 inches in diameter and 2 inches in maximum thickness, approximately. Partly around each humerus was an armlet of sheet-brass about 3.5 inches in width. These armlets had not entirely enclosed the arms, the extremities being about 1.5 inch apart and having each two holes to accommodate a cord or sinew. Around each wrist were bracelets of iron, two in one instance, three in the other. These bracelets, which are badly corroded, are open at one place, like the armlets.

Burial No. 12 was at the bottom of a grave-pit, closely flexed and reclining against the side of the pit. Two pipes, one of earthenware (Fig. 83) and a small globular one of limestone, were at the left forearm; a small, flint arrowhead lay in front of the pelvis. A deposit of red pigment was along the left side of the trunk.

Burial No. 13. This skeleton was reclining against the side of the pit, the thighs vertical, the legs bent against them, the skull bending over until it reached

the pelvis behind the thighs. The right humerus was almost horizontally forward, the forearm partly flexed toward it; the left humerus downward and forward, the forearm flexed across the trunk. This grave-pit was 5 feet 8 inches in depth.

Burial No. 14 was reclining, closely flexed, against the side of a grave-pit 4 feet 2 inches in depth, the head bent over between the knees, both humeri along the trunk, the forearms lying across the pelvis.

Burial No. 15, badly disturbed by the pit dug for Burial No. 12. Near the bones lay part of a pipe of claystone, which probably belonged to the midden debris around, the broken surface of the pipe showing age.

Burial No. 16, reclining against the side of the grave, the trunk tilted to one side, the thighs upward and widely separated, the legs closely flexed on them, the skull bent over against the right leg just below the knee, the right humerus projecting horizontally forward, the forearm partly flexed, the left humerus extending out from the side of the trunk horizontally, the forearm partly flexed on it. Depth of pit, 5 feet.

Burial No. 17, the trunk reclining against the side of the pit and somewhat tilted to the right, the right femur extending upward and outward, the left femur vertical, the legs closely flexed against the thighs, the head crushed down on the pelvis, the right humerus downward along the trunk, the forearm across the pelvis, the left humerus extending laterally at a right angle from the body, the forearm flexed closely on it. In front of the right humerus, in a little heap, were one flint arrowhead and seven small scrapers of like material. Below these, between the skull and the femur, was a knife of iron or of steel, having a projection from the blade, which, perhaps, had been encased in wood to serve as a handle. With the knife were two pebbles and a large flake of flint.

Burial No. 18, partly flexed on the left, 3 feet 10 inches down.

Burial No. 19 lay at length on the back as far as the knees, the legs closely flexed against the thighs, 4 feet 5 inches down.

Burial No. 20, partly flexed on the left, the humeri along the trunk, the forearms closely flexed on them.

Burial No. 21, the trunk leaning against the side of the pit, which was 5 feet 8 inches deep, the thighs widely apart, the legs flexed against them, the skull crushed down between the thighs and resting on the pelvis, the humeri parallel to the trunk, the forearms brought forward across it.

Burial No. 22, closely flexed, reclining against the side of the grave-pit, the knees drawn up nearly to the head, which leaned over somewhat. The arms were down alongside the body, the forearms across it. Depth of pit, 5 feet 6 inches.

Burial No. 23, partly flexed on the left, 4 feet down. A boss of sheet-brass, .6 inch in diameter, having a small, central hole for attachment, was at the left ear, none, however, being present on the opposite side of the head, though part of one was found on the pelvis where presumably it had fallen. Glass beads were at the left forearm.

Burial No. 24, the trunk resting sidewise against the wall of the pit, which was 5 feet 2 inches deep, the head forced down on the pelvis and resting between the thighs, which were flexed obliquely upward, having the legs closely flexed against them. The right humerus slanted downward and outward, the forearm flexed on it and crossing the pelvis; the left humerus extended obliquely down alongside the skull, the forearm partly flexed across the pelvis. A pipe of limestone (Fig. 84) was above the left shoulder, and ten arrowheads of flint, the

FIG. 84.—Pipe of limestone. With Burial No. 24, Hampton Place, Tenn. (Full size.)

smallest of which was 1.1 inch in length, were at the outer side of the left humerus. The skull of this skeleton was saved.

Burial No. 25 had been cut away in part by a grave for another burial. Both humeri, however, were present, and on each was an armlet of brass of the kind already described as having been found at this place.

Burial No. 26, reclining on the side of the pit, which was 4 feet 3 inches deep, the femora about vertical but somewhat separated, the legs flexed on them, the head bent over between the knees, both humeri alongside the body, the forearms crossing to the pelvis. On the chest was a disc of sheet-brass 5.25 inches in diameter, having a small central hole for attachment, and a number of glass beads which probably had been strung on the cord by which the disc had been suspended.

Burial No. 27, partly flexed to the left, the trunk face down, the right humerus slightly forward and under the body, the forearm in line with the humerus, the left upper arm somewhat out from the body, the forearm flexed back under the thorax.

This burial was exceptional, the skeleton lying in a grave 4 feet 3 inches deep, which had been filled in to a depth of 14 inches with the ordinary material from the site, leaving a concave surface. Above this was a layer of charcoal, 7 inches deep, which followed the outline of the sandy loam. Above the charcoal was reddened clay in small masses, having a maximum thickness of 15 inches, which, in its turn, was covered by 14 inches of sandy loam.

Burial No. 28 lay partly flexed to the right, the right humerus along the trunk, the forearm crossing the body at about a right angle, the left upper arm along the thorax, the forearm flexed upward and across the thorax. Three chips, and five flint arrowheads, the smallest 1.05 inch in length, lay at the left of the skull, and at the outer side of the left elbow, in an elongated pile, were 47 fragments nearly all of flint, a few probably of quartzite, the largest

Fig. 85.—Pipe of earthenware. With Burial No. 28. Hampton Place, Tenn. (About full size.)

having the bulk, but not the outline, of a hen's egg; three pebbles; three leaf-shaped implements of flint, the largest 3.75 inches in length; a small flint scraper. On the thorax lay an interesting pipe of earthenware (Fig. 85) having perforated projections on two opposite sides of the bowl, a very rare form, and two discs, one of copper, about 5 inches in diameter, lying immediately above the other, which is of brass and has a diameter of 6.3 inches. Both these discs have central, circular openings, the smaller slightly more than 2 inches across, the larger 3.3 inches in diameter.

Burial No. 29, a child 44 inches down, having glass beads at the neck and wearing a bracelet of sheet-brass rolled to make a roughly-circular cross-section and having the extremities drawn around to bring one somewhat above the other.

Burial No. 30, the trunk lying extended on the right side at the bottom of a pit 5 feet in depth, the right humerus projecting somewhat from the side, the forearm partly flexed on it, the left upper arm along the trunk, the forearm flexed against its upper arm, the right femur diagonally across the pelvis, the tibia closely flexed on the thigh, the left femur vertical, its tibia partly flexed on it.

Burial No. 31, the trunk against the side of the pit, bending forward, the thighs together and vertical, the legs closely flexed on them, the skull bent over back of the femora, on the pelvis, the right humerus down along the aside of the pit, the left humerus diagonally forward and down, both forearms across the pelvis. On the sternum was a disc of sheet-brass 4.5 inches in diameter, having a circular opening in the center somewhat less than 1 inch across. Above the head was a rusty blade of iron or of steel. Burnt clay lay just above this burial, which, however, was not affected by heat. The grave-pit was 5 feet in depth.

In the digging were found, apart from burials, a number of arrowheads and scrapers of flint; a celt of igneous rock, 4.5 inches in length, grooved on its narrower sides to facilitate fastening; a pebble about 3.5 inches long, rudely chipped to form a spearhead; and a jaw probably of a young bison.

The entire property at this place was carefully searched with a view to the discovery of minute arrowpoints and in the hope of finding another cemetery, in both of which efforts, however, we were unsuccessful, though considerable digging was done in various places which evidently had been aboriginal dwelling-sites.

From the surface came: A considerable number of arrowheads and knives of flint, some of the arrowheads being slender and triangular like most found in this region, the smallest one being about .75 inch in length; small scrapers of flint; rude chisels of shale; a pebble notched on two opposite sides, evidently a sinker, found near the river-bank; a stone of considerable size, deeply pitted in three places and showing other somewhat elementary pits; a handsome point of flint, 3.5 inches in length; a small, triangular pendant of sheet-brass, pierced at one end for suspension.

Mr. Earle Haney, son of the tenant on the lower part of the Hampton Place, a pupil at the high school in Chattanooga and much interested in Indian antiquities, informed us he had resided on the place eight years and had found on it quantities of arrowpoints, none of which, however, was less than one-half inch in length, and points of this size were very exceptional.

Following along the bank, upstream, on this property for about one mile, one comes in sight of a mound (Mound A) near a building used for the storage of hay. This mound, 6.5 feet high, measured from the outside, and 42 feet in diameter of its irregularly circular base, evidently had been much dug into previously in the upper part.

A central excavation 12 feet square was put down by us, soon reaching bones scattered by former diggers, and in another place, four slabs of stone near which no bones were found. At a depth of 4.5 feet the upper part of a skeleton was reached, the remainder having been cut away by digging, aboriginal or recent. A dark base-line was reached 6 feet 7 inches down, which had been cut through by a grave 45 inches long by 2 feet wide, extending 10 inches into the undisturbed, underlying soil. In this grave no trace of bone remained, though a small quartz crystal, which doubtless had been with a burial, was found.

In sight from Mound A, did not the building intervene, was a low mound, or the remainder of a mound, which had been under cultivation. Its height at the time of our visit was 18 inches; its diameter, 50 feet. A central excavation 12 feet square was put down by us, about in the middle of which was a skeleton, closely flexed on the left, which evidently had been placed on the original surface of the ground and earth piled over it. At the lower part of the pelvis, not in a pile but scattered along near one another, were twenty-three triangular arrowheads of flint, having concave bases, some slightly broken, the smallest of which was .75 inch in length.

This mound was on a slope, consequently the outer part of it on one side was of greater depth than were the central parts, and that portion which was higher on the slope. A burial found considerably away from the center and in that part of the mound which descended the slope, was at a depth of 3.5 feet. The mound at this point was 27 inches to the base, and the grave in which this burial lay extended 16 inches into underlying soil, the grave being 4 feet wide by 6 feet 2 inches in length. The skeleton lay at full length on the back, without artifact of any kind.

About 250 yards W. by N. from Mound A was another which probably had been about 3 feet in height, but which was so thoroughly gutted that marginal parts only surrounded an excavation.

Approximately 180 yards NNW. from Mound A was one 3.5 feet in height and 45 feet in diameter, filled with comparatively recent burials in coffins.

In the neighborhood of 315 yards NE. from Mound A, on the summit of a low hill overlooking the river, was a mound 5.5 feet in height and 35 feet in diameter of its circular base. This mound, which culminated almost in a peak, had trees upon it and evidently never had been under cultivation. An excavation 12 feet square reached a distinct, dark, basal line resting on clay and gravel at a depth of 6 feet 3 inches from the summit of the mound. No sign of bone, sherd, or chipped stone was encountered in this mound, and no grave had cut through the base.

Dwelling-site on Chattanooga Island, Hamilton County.

Opposite the city of Chattanooga is a small island, the property of Mr. Joseph Willis of Chattanooga, which has some history of burials and artifacts discovered there in the past. A careful examination of the island showed it to have been an aboriginal dwelling-site, but its proximity to a large city presumably had been the cause that but few objects of interest were visible on the surface. No fragments of human bones were to be seen, nor was there any rise of the ground or marked darkening of the soil to indicate the presence of burials.

A number of trial-holes were put down in different parts of the island, one of which came upon a skeleton lying closely flexed to the right, the right forearm flexed back against the humerus, the left forearm diagonally up across the thorax.

The head was directed E. by N. This burial, which was without artifacts, lay at a depth of 28 inches.

On the surface were picked up by our party twelve arrowheads or knives, of flint, all with shoulders or rudimentary shoulders, or with single shoulders (some having been made in this way). These twelve flints ranged in size between somewhat more than 1 inch and about 2 inches. The flint was variously black, pink, white, and shades of brown and gray.

At the Citico site, which next will be described, and which is visible from Chattanooga, quantities of arrowheads were found, almost all of which are triangular, and all, save very few, are of black flint. These facts illustrate how difficult it would be to generalize as to this region.

Citico[1] Mound and Site, Hamilton County.

A short distance above the city of Chattanooga, in view from its water-works and from Tennessee river, is a mound in a large, cultivated field, belonging, at the time of our first visit, to Mr. George W. Gardenhire, of Chattanooga, and when the place was again visited by us, to the Montague estate, represented by Mr. N. Thayer Montague, of Chattanooga. The mound, which takes its name from nearby Citico creek, 15.5 feet in height, has been quadrangular with a flat top, but as every part of its surface has been under cultivation, the corners of the mound are now rounded, though the sides are astonishingly steep considering the plowing and subsequent wash of rain to which they must have been subjected. In basal diameter the mound is 110 feet by 145 feet; the summit-plateau in corresponding directions, 71 feet by 42 feet.

The investigation of the mound described by Mr. M. C. Read in the Smithsonian Report for 1867, tells of a tunnel carried into the mound, of skeletons found below the base, and of the discovery of post-holes, etc.

Probably a structure of some kind had existed and burials had been made beneath it, or it had been erected over burials and the mound had been built around and above the structure.

The mound, however, was domiciliary and not a burial mound, as an excavation 12 feet square sunk by us to a depth of 12 feet from the center of the summit-plateau encountered no interments or signs of interments. Evidence of former

[1] The Citico mound described here, and the creek of that name which is referred to, as we have stated before, must not be confused with others of like name described in the 12th Annual Report of the Bureau of American Ethnology, pp. 373 and 375. The Citico creek there mentioned, near which a Citico mound is, flows into Little Tennessee river and the mound is near the junction in Monroe County, Tenn. Little Tennessee river enters the Tennessee opposite Lenoir City. The Citico mound in Monroe County is referred to by Cyrus Thomas in his "Catalogue of Prehistoric Works," p. 210. For the name Citico (Sĭ′tikû′) see Mooney in 19th An. Rep. Bur. Am. Ethn., p. 531. The Citico mound near Chattanooga, in Hamilton County, examined by us, is described in the Smithsonian Report for 1867, p. 401 *et seq.*, and is referred to by Cyrus Thomas in 5th An. Rep. Bur. Am. Ethn., p. 77 *et seq.*

digging was found in places, but no trace of skeletal remains was present in the material.[1]

Extending ENE. and WSW. from the mound, which is near the western end, is a ridge with flat top, about 250 feet in width and 600 feet in length, and having a height, judging from holes put down from the surface to undisturbed clay, of about 4 feet. On the eastern end of this ridge is an elevation of about 3.5 feet. The ridge is artificial, or mostly so, and has grown up under prolonged occupancy.

Over the surface of the ridge, the elevation, and part of the mound is abundant midden-debris, including shells, considerable pottery, and fragments of flint. The pottery, shell-tempered, is as a rule coarse and undecorated, some of the fragments, however, bearing very elementary, incised designs rudely executed. One sherd, however, of hard, smooth ware and having but little shell-tempering, if any, had an incised decoration of partly interlocked scrolls, fairly well executed. Another bore a design conferred by the aid of a stamp, and a fragment of yellow ware was found bearing part of a design in red paint.

Finished artifacts on the surface were rare, the site evidently having been carefully searched by visitors from town, where there is a ready market for antiquities, and we learned that a former resident of Chattanooga had systematically dug into the ridge for a considerable period in search of artifacts to sell. The elevation at the end of the ridge, however, strangely enough, had remained uninvestigated. Our surface "finds" consisted of one rude celt; a number of arrowheads of flint, nearly all triangular, some slender, some almost equilateral, and nearly all less carefully made than the projectile points taken later from the graves by us; a part of a small pipe of earthenware, having much of the bowl missing and the marginal surfaces carefully smoothed to allow the part of the pipe remaining to serve some purpose; a small, undecorated pipe of soapstone.

On various parts of the ridge and of the elevation at its eastern end were fragments of human bones.

Trial-holes in the elevation which soon reached burials, showed it to be somewhat unlike the ridge, the elevation being composed in part of midden debris, but having also local layers of clay of varying shades to within one foot of its surface, above which was midden deposit. Presumably the elevation had been built on the ridge and then lived upon.

The ridge was carefully dug over by us, and burials were found to be widely scattered in it and to have almost no artifacts with them. Presumably, more important persons had been interred in the elevation, which was constructed for burial purposes exclusively.

In all, one hundred and six burials were discovered, and numerous fragments and scattered bones. Such burials from the elevation as were comparatively

[1] Since our visit, two-thirds of Citico mound has been dug away in making the new River Road. We are informed by a friend in Chattanooga, who was greatly interested in the work, himself a collector, and explorer of mounds, that nothing of interest was found during the removal. Burials and some artifacts were encountered near the base.

The newspapers, of course, made the most of the matter.

deep had been deposited in graves which could be traced almost from the surface down, and no doubt had been made from the surface, but the confusion arising from cultivation of the field made impossible a determination as to the upper few inches of the soil.

The burials, whose heads were directed to various points of the compass, were: of adults, 70; of adolescents, 4; of children and of infants, 32.

The forms of burial were as follows:

Extended on the back, 2.

Closely flexed to the left, 1.

Partly flexed to the right, 17.

Partly flexed to the left, 17.

Partly flexed on the right, 15.

Partly flexed on the left, 6.

Bunched, 1.

Positions to be described in detail, 8.

There were also seven disturbances, recent and aboriginal.

The reader will recall that, when not otherwise stated, burials are those of adults, and that the form of burial of infants and children is not included.

We shall now describe in detail all burials from this place with which any artifact was found, as well as such burials which otherwise may seem worthy of special notice.

Burial No. 2, but a few inches from the surface, partly flexed to the right, the cranium pointing S. by E. At each side of the head was a shell ear-plug made from a conch-shell, and resembling a bracket in shape.[1] At the neck were shell beads rather badly decayed.

Burial No. 3, one foot down, extended on the back and having the right fore-arm flexed back on the humerus, the hand resting on the shoulder, the head SE. At the outer side of the left forearm was a small, undecorated pot of inferior earthenware.

Burial No. 4, partly flexed on the left, the head S. by E., lay in a pit 2 feet deep, 25 inches wide by 4 feet in length. Under the body, so that both elbows rested upon it, where probably it had slipped, was a mask-like gorget of shell, showing human features. This ornament, which belongs to a well-known class,[2] is greatly decayed and somewhat broken in one place.

Burial No. 5, a child, 9 inches deep, the skull SE. At each side of the cranium were small, shell ear-plugs of the "bracket" shape.

Burial No. 6, presumably a bunched burial, having three skulls together, the long-bones being somewhat loosely placed.

[1] William H. Holmes, "Art in Shell of the Ancient Americans," 2d An. Rep. Bur. Am. Ethn., p. 216, Fig. 10. Gates P. Thruston, "Antiquities of Tennessee," 2d ed., 1897, p. 315, Fig. 223.

[2] William H. Holmes, *op. cit.*, p. 293 *et seq.* George Grant MacCurdy in "American Anthropologist," July–Sept., 1913, p. 395 *et seq.* C. B. Moore, "Antiquities of the St. Francis, White and Black Rivers," pp. 287, 321, Figs. 16, 45; and "Some Aboriginal Sites on Mississippi River," pp. 412, 415, Journ. Acad. Nat. Sci. Phila., Vol. XIV.

Burial No. 7, the scattered bones of a disturbance, presumably including two skulls, at a general depth of 16 inches. Somewhat apart from the bones, though no doubt originally with them, was an implement of gray flint, somewhat more than 6 inches in length (Fig. 86). One of similar shape, but smaller, was found

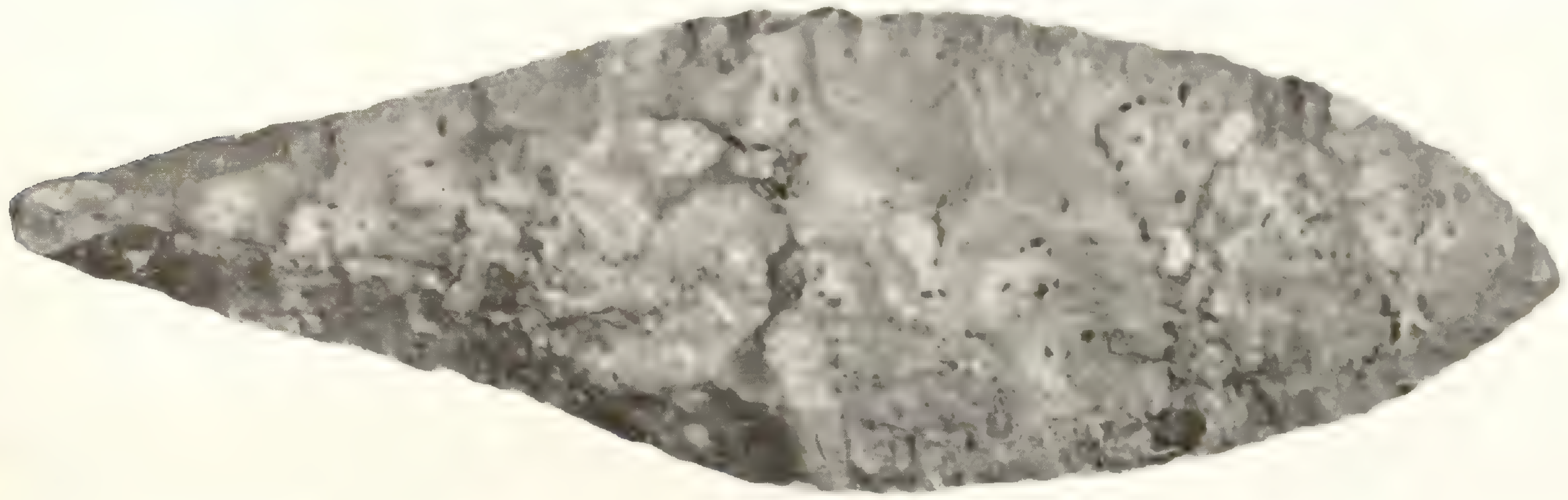

FIG. 86.—Blade of flint. With Burial No. 7. Citico, Tenn. (Full size.)

by us in the aboriginal cemetery on the Bradley Place,[1] Crittenden County, Ark. We have not been able to find other illustrations of implements exactly like this one in publications relating to aboriginal work in stone. Dr. H. M. Whelpley of St. Louis, however, whose collection is so well known, tells us the specimen is not uncommon and that in his collection are a number similar in type.

Also out of place among the bones was an ear-plug of the pin-shape variety, made from the columella of a conch-shell and having a considerable knob at the head; and a small arrowpoint of flint.

Burial No. 8, partly flexed to the right, the head ESE., in a grave 2 feet in depth. Under the skull was some red pigment, red oxide of iron.

Burial No. 9, about one foot deep, had that part of the skeleton which is below the pelvis cut away by another grave. The head was directed SE. On the lower part of the thorax was a handsome celt of argillaceous, sedimentary rock somewhat exceeding 8 inches in length and plainly showing where the handle had been attached. Immediately on this implement lay a celt of iron or of steel, about 4 inches in length.

Several celts of this kind were found with burials at the Citico site, yet absolutely no other objects indicating contact with white people were present except four glass beads found with a comparatively superficial burial. One would expect in a site where the aborigines had been able to obtain iron from the whites that many other articles of European origin would be present. We were so impressed by this anomalous character of the deposits at this place that though we realized the chances of having found celts of meteoric iron (which, as the reader knows, could have been made by the aborigines without contact with whites) were small, we decided to have the matter definitely deter-

[1] "Some Aboriginal Sites on Mississippi River," Fig. 44.

mined by submitting one of the celts to Harry F. Keller, Ph.D. (whose tests, especially in the case of copper, have aided us to such an extent in the past), with the request that an examination of the celt be made with a view of determining the possible presence of diamonds and nickel. Dr. Keller reports as follows:

"The iron blade shows no distinct crystalline structure when etched with dilute nitric acid or with iodine, and careful chemical tests show that the metal is free from foreign metals such as nickel, cobalt, and copper. A solution obtained from several grams of the metal, after precipitating the iron, did not respond to that most delicate of reactions for nickel: the dimethylglyoxime test. There can be no doubt, therefore, that this iron is not of meteoric origin."

Here, then, we find the aborigines possessed of a number of blades of iron manufactured by the whites, and yet apparently having almost no other objects of European provenance.

Burial No. 10, in a grave 35 inches deep, was a skeleton partly flexed on the right, the head SE. At each side of the skull was an ear-plug of the pin-shape variety, about 6 inches in length. At the right of the cranium were the remains of a rattle consisting of the shell of a turtle or a tortoise, enclosing pebbles, and one valve of a large cockle (*Cardium robustum*), a marine shell. At the outer side of the left shoulder, grouped together, were: fragments of the shell of a turtle or a tortoise, with a number of small pebbles, mingled with which were some of the throat teeth of the fresh-water drum-fish (*Aplodinotus grunniens*),[1] which no doubt made an excellent substitute for pebbles; the penis-bone of some animal;[2] a bone piercing implement; nine musselshells (*Lampsilis anodontoides*). On the upper part of the thorax was a gorget of shell with scalloped margin, much resembling one shown by Thruston[3] and by Holmes,[4] which has incised centrally a triskele. With the gorget was a shell bead .75 inch in length. In the space between the femora (which the reader may recall were drawn up) and the trunk was a bowl of earthenware, 6.5 inches in diameter, undecorated save for six small lugs projecting from the margin of the opening.

Burial No. 11. This skeleton, 22 inches down, heading SSE., lay on the back, the right thigh extended in line with the trunk, the left thigh slightly bent toward the right one. Both legs were flexed to an acute angle with the thighs; the left forearm was flexed closely on the humerus.

Burial No. 12. In a grave 3 feet deep lay a skeleton partly flexed to the right, the head NW. At each side of the cranium was an ear-plug of the pin-shape variety; small shell beads were at the neck and at the right wrist. At the right hand was an earthenware pipe badly crushed, which has since been restored (Fig. 87).

[1] This variety of drum-fish frequents the Mississippi and its tributaries.
[2] This bone went astray when submitted for identification.
[3] *Op. cit.*, Fig. 230.
[4] "Art in Shell of the Ancient Americans," Pl. LVI.

This interesting pipe is of a form characteristic of the Citico site. McGuire[1] shows a pipe somewhat like ours as coming from Camden County, Ga., mentions another from Blount County, Tenn and says they apparently establish quite an interesting conventional treatment of the beak of a bird.

Fig. 87.—Pipe of earthenware. With Burial No. 12. Citico, Tenn. (About full size.)

At the upper end of the left femur were three discoidals of fine-grained, igneous rock, each about 1.5 inch in diameter. Six slender arrowpoints of flint lay near the knees.

Burial No. 13 had been somewhat disturbed by the plow, but there were clear indications that the bones had been partly flexed to the right, the head NNW. Near the skull was a celt 5.5 inches in length, which was presented to Mr. Gardenhire, the owner of the property.

Burial No. 14, partly flexed to the right, the head SSE., had at the right shoulder a small, undecorated pot, a part of which had been plowed away.

Burial No. 15 consisted of remains of a skeleton somewhat disturbed but with parts in order. At the knees and neatly piled were twenty small arrowheads of flint, all triangular and all pointing the same way.

Burial No. 16, a child, the bones somewhat disturbed by an intersecting grave. With this burial were two discoidals of igneous rock, each about 1.25 inch in diameter.

Burial No. 17, about 2 feet deep, lay partly flexed to the right, head ESE. Under the lumbar region was a small flint arrowhead.

Burial No. 18, 32 inches deep, lay partly flexed to the right, the head SE. The left forearm was across the trunk. Under the skull and extending under the left shoulder and down the outer side of the humerus were fifty-nine mussel-shells, badly decayed and broken. Some of these shells were perforated at one end for suspension, as doubtless all had been, but parts of some which would have testified as to the fact, were missing. On the thorax were eleven similar shells; there were five on the lower part of the trunk, and nineteen on the outer side of the right forearm.

Burial No. 19 was a disturbance. At the left of the skull lay an undecorated bowl badly crushed.

Burial No. 21, partly flexed to the left, head E. by S.; depth, 3 feet. Near the skull were two pebble-hammers.

Burial No. 22, partly flexed to the left, head NW.; depth, 2 feet. At the neck were a number of marine shells (*Marginella apicina*) perforated for use as beads.

[1] Joseph D. McGuire, "Pipes and Smoking Customs of the American Aborigines," Rep. U. S. Nat. Mus., 1897, Fig. 234.

Burial No. 23, partly flexed to the left, head NW.; depth 14 inches. On the thorax lay a gorget of shell, the surface much decayed away in places, which had borne a conventionalized design of the rattlesnake. Gorgets better preserved than this one and likewise having the design of the rattlesnake, will be shown in connection with Burials Nos. 41 and 56.

Lying immediately on the gorget was a ceremonial axe of porphyry, 5 inches in length, of the "hoe-shaped" variety.[1] These axes, which have been extensively figured by others as well as by ourselves, often show where the handle has been placed on them. We found, moreover, at Moundville, Ala.,[2] a shell ornament showing one of these axes set in its handle.

The ceremonial axe, including the South American type, has been interestingly discussed in the superb work of Verneau and Rivet.[3]

Near these, but some little distance from the skeleton, were two undecorated shell gorgets which had perhaps belonged to a much-disturbed burial, parts of which were nearby. To the left of the pelvis, grouped together, were a small chisel of iron or of steel (see our description of Burial No. 9); a flat pebble of flint, 3 inches by 2 inches, much chipped at one end as by use; six small arrowheads, three leaf-shaped implements and two triangular, all of flint, ranging between 2.3 inches and 3.5 inches in length; also many flint fragments and chips.

Burial No. 24, partly flexed to the left, head NW., rested on Burial No. 23. On the lower part of the thorax was a celt which was given to Mr. Gardenhire.

Burial No. 26, partly flexed on the right, head SSE., both forearms closely flexed against the upper arms; depth, 2 feet 7 inches. Immediately on this burial were two slabs of cedar, each nearly 4 feet long and about 5 inches in width, which had been rudely split, not dressed like planks. On the left shoulder and extending down over the body were fragments of bones of lower animals. These fragments did not show decay and evidently had been broken intentionally. The following animals were represented, according to the identification of Dr. F. A. Lucas: raccoon, part of jaw; black bear, a large animal, parts of humerus and femur; Virginia deer, parts of vertebræ, foot-bones, shoulder-blade, etc.; wild turkey, upper part of tarsus; loon (*Urinator imber*) femur; soft-shelled turtle (*Aspidonectes spinifer*) cranium and shoulder-blade; Mississippi catfish (*Amiurus lacustris*) a big fellow, 75 to 100 pounds in weight, back of cranium.

On each side of the head was a shell ear-plug of the pin-shape variety, one of which had been moved slightly from the skull through some cause or another. Two similar ornaments lay side by side on the upper part of the thorax, the

[1] C. B. Moore, "The so-called 'Hoe-shaped' Implement," American Anthropologist, July–Sept., 1903.

[2] "Moundville Revisited," Journ. Acad. Nat. Sci. Phila., Vol. XIII, Fig. 99.

[3] R. Verneau et P. Rivet. Ministère de l'Instruction Publique. Mission du Service Géographique de l'Armée pour la Mesure d'un Arc de Méridien Équatorial en Amérique du Sud, le sous Contrôle scientifique de l'Académie des Sciences, 1899–1906. Tome 6, "Ethnographie Ancienne de l'Équateur." Premier fascicule. Paris, 1912.

points toward the skull. The putting of an extra pair of ear-plugs with a burial by the aborigines is not new in our experience. Between the arms was a celt of quartzite, 3.3 inches in length, and a smaller one of fine-grained igneous rock rested between the elbows and pelvis. Nine arrowheads of flint, whose position was disturbed on removal, had been on the right knee.

Burial No. 27, partly flexed to the left, the head SE., the right forearm across the trunk; depth, 17 inches. On the lower part of the thorax was a marine univalve, dropping to fragments through decay. At the outer side of the left shoulder were two bone implements. Each of these had the end formerly in use greatly rounded either intentionally or through service. One, 8.5 inches in length, made from a femur of a deer, has the articular portion removed; and

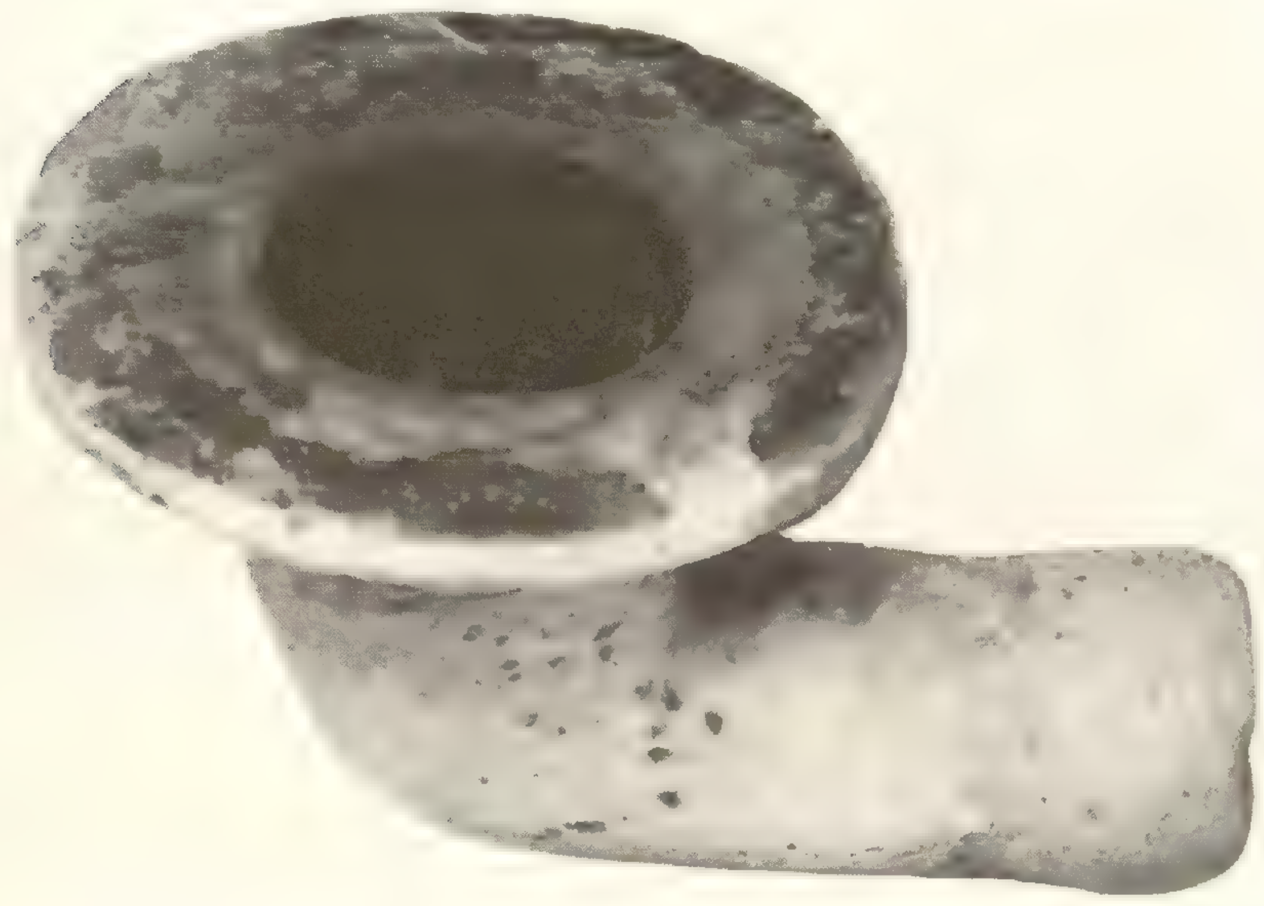

Fig. 88.—Pipe of earthenware. With Burial No. 33. Citico, Tenn. (About full size.)

Fig. 89.—Pipe of claystone. With Burial No. 35. Citico, Tenn. (About full size.)

below, on one side, is a hole as for suspension. The other, about 8 inches long on which the articular part remains, is worked down from "the left ulna of a *very* large panther" (*Felis concolor*). We are indebted to Dr. F. A. Lucas for the identifications.

At the right elbow was a small, undecorated vessel of earthenware—a pot or possibly a wide-mouthed water-bottle. At the feet were fragments of rattles which had been perforated for suspension. In place within the tortoise or turtle shells had been, instead of pebbles, the rounded throat-teeth of the fresh-water drum-fish (*Aplodinotus grunniens*).

Burial No. 30, partly flexed on the right, head NW.; depth, 32 inches. At the neck were a few shell beads, and in the soil nearby, perhaps an adventitious deposit, was a disc made from part of a pottery vessel.

Burial No. 33, the remains of a badly decayed skeleton which had been partly flexed to the right, the head SE.; depth, 28 inches. Near the skull was a pipe of indurated clay, with a rim extending laterally, as shown in Fig. 88, after restoration. At the left shoulder were two chisels of shaly, sedimentary rock,

each about 4 inches in length, rudely circular in cross-section, and a celt 3.25 inches long, which was presented to Mr. Gardenhire.

Burial No. 34, the bones of a child, 20 inches down, which had been somewhat disturbed. At the neck were a number of shell beads, rudely discoidal as a rule, some small, but many nearly .75 inch in diameter. With the beads evidently had been suspended an undecorated gorget which lay on the chest. Broken ear-plugs were near this burial.

Burial No. 35, partly flexed to the right, the head SSE.; depth, 20 inches. Near the outer side of the left shoulder was a pipe of indurated clay, somewhat resembling the one found with Burial No. 33. The end of the portion intended

Fig. 90.—Vessel of earthenware. With Burial No. 39. Citico, Tenn. (Diam. 5.3 inches.)

to receive the stem had been broken and the ragged margin had then been smoothed to allow the continued use of the pipe (Fig. 89). About 9 inches from the left elbow was a celt of quartzite, about 5.5 inches in length, which may have belonged to another burial, scattered bones from which were nearby.

Burial No. 36, partly flexed on the left, the head SW. This burial lay in a grave-pit 4 feet 7 inches deep. The failure to find artifacts of any kind after the trouble taken in its removal was a disappointment.

Burial No. 39, a child. At the head were two shell ear-plugs, and two small vessels of earthenware, one undecorated, the other with loop-handles and a rude decoration of parallel, incised lines (Fig. 90). Shell beads were at the neck, and near the cranium was a rude stone ring of ferruginous, silicious rock, a natural formation helped out by art. On the skull, covering a very small area, was a green stain showing the former presence of copper.

Burial No. 41, a young child, 28 inches down. Large and small shell beads were on the neck, and on the thorax was a gorget of shell 5 by 6.5 inches, bearing an incised, well-known design of a conventional rattlesnake (Fig. 91).

The design of the rattlesnake highly conventionalized on gorgets, seems to be almost exclusively a product of the aboriginal art of Tennessee, practically all the gorgets of this class figured and fully described by Holmes[1] being from

Fig. 91.—Gorget of shell, with conventional rattlesnake design. With Burial No. 41. Citico, Tenn. (About full size.)

that state. Thruston[2] speaks of thirty or forty of these elaborately carved gorgets as having been found along the upper valleys of the Tennessee river (meaning from the tributaries of the Tennessee), and says of gorgets of this class: "The central head, the coiled body with its complicated and obscure involutions, the scaly surface, and the marginal band, are constantly repeated

[1] William H. Holmes, "Art in Shell of the Ancient Americans," Plates LXIII, LXIV, LXV, Figs. 4 and 6, LXVI, Fig. 2.

[2] *Op. cit.*, p. 331 *et seq.*

in the general design. Sometimes the strange, coiled figures can scarcely be recognized, yet, upon patient examination, the mythological serpent is always found to be represented." The gorgets of this kind figured by Thruston are taken from Holmes' "Art in Shell," and are from Tennessee. The earliest account of the design of the conventional rattlesnake on gorgets is by the late Jeffries Wyman.[1]

Burial No. 42, a young child, 32 inches down, having shell beads at the neck and an undecorated gorget of shell on the chest.

Burial No. 45, a young child, 3 feet down. On the chest was a shell gorget in the shape of a mask representing the human face, 4.7 inches long and 3.8 inches wide.

Burial No. 46, a child; depth, 39 inches. A small discoidal of limestone was at the knees. Incidentally, it may be said that in the midden-debris at this place and on the surface were a number of small, discoidal stones, and stones of this kind were found with the burials of children. Also there were found many discs of pottery made from fragments of earthenware vessels, some of these discs being very carefully rounded. The small stone discs presumably were not of sufficient size to have been used in the game of chunkey, but it is possible they were employed in some other game and may have been used interchangeably with the pottery discs. As the reader probably is aware, these discs of earthenware, found so widely throughout the United States, were used in ancient times abroad. They are found in Italian neolithic stations and in Egypt.[3] Similar discs belonging to a pre-Roman period have been discovered in Basel, Switzerland.[2]

Burial No. 47. The trunk of this skeleton lay on the back, the right humerus along the body with the right forearm crossing to the pelvis. The left upper arm lay along the trunk, the forearm across it. The thighs were widely separated, the legs being flexed at an acute angle, bringing the feet together. The head was directed NNW. The burial was 4.5 feet deep. At the neck were small marine shells pierced for use as beads (*Marginella apicina*). On the chest, having been suspended by a string of beads, was a shell gorget of the human-face variety, 6.5 inches long by 5 inches in width. At the right and left wrists were beads of the same variety as those found on the neck.

Burial No. 49. The upper part of the trunk of this skeleton, which was 32 inches from the surface, was on the right side, the lower part on the back, the thighs being flexed to an almost vertical position and being, of course, near together. The legs were flexed down from the knees at an acute angle, being consequently near the thighs. The head was NE. At the right hand was a leaf-shaped implement of flint, 5.6 inches in length and 2.4 inches in maximum width.

[1] Fifth Annual Report Peabody Museum, p. 17 *et seq.*

[2] Angelo Mosso, "The Dawn of Mediterranean Civilization," pp. 88, 89.

[3] Karl Stehlin, "Die Praehistorische Ansiedelung bei der Gasfabrik in Basel," "Anzeiger für Schweizerische Altertumskunde," Band XVI, Heft 1, p. 9.

Burial No. 50, a young child, bones badly decayed, 33 inches down, having shell beads at the neck.

Burial No. 51, partly flexed on the left, the head SSE.; depth, 3 feet. With this burial was a pipe of indurated clay, having a small part missing from the end which received the stem.

Burial No. 52, a child, the bones much decayed; depth, 34 inches. At the neck were shell beads, and at the chest a shell gorget of the human-face variety, very badly decayed. Beside it was a broken bowl of earthenware, undecorated except for small projections which probably represent head, tail, and fins, an effort to bring it into the effigy class.

Fig. 92.—Gorget of shell, having a conventional rattlesnake design. With Burial No. 56. Citico, Tenn. (About full size.)

Burial No. 53, a child, 40 inches down. At the neck were shell beads, each flat, oblong, and notched on two opposite sides, which had served to suspend a gorget lying on the chest, bearing an engraved design representing the conventional rattlesnake, part of which had scaled away through the action of moisture.

Burial No. 55, partly flexed on the right, head NW.; depth, 40 inches. Shell beads were at the neck.

Burial No. 56, a child; depth, 26 inches. On the chest was a shell gorget having the conventionalized rattlesnake design (Fig. 92).

Burial No. 57, a child, depth, 31 inches, having at the neck shell beads and on the chest a gorget bearing the design of a rattlesnake, conventionalized, part of which had scaled away. Over the pelvis were two vessels—a bowl with undecorated body having two small, flat handles projecting horizontally, in which, upright, stood a pot with two loop-handles and rude line-decoration on the upper part of the body which also was surrounded by a fillet. In this pot was the skull of an infant which probably got there through the great disturbance of burials prevailing in the elevation.

Burial No. 58, partly flexed to the right, head NE. by E.; depth, 6 inches. Shell beads were at the neck.

Burial No. 59, partly flexed to the left, head N.; depth, 16 inches. At the neck were 411 shell beads, in addition to broken ones, some globular with flattened poles, some barrel-shaped, the largest bead being about .75 inch in diameter.

Burial No. 60, partly flexed on the left, the right forearm across the trunk, the head SW.; depth, 35 inches. At the neck were small marine shells used as beads, very badly decayed, and at the chin was a gorget of shell on which had been engraved the usual conventional rattlesnake design, most of which, however, had decayed away. Both wrists were stained green by salts of copper. At the right wrist there still remained small, tubular beads of that metal.

Burial No. 61, partly flexed to the right. Some of the skull was missing through contact with a plow, which doubtless had carried away also a shell ear-plug of the "bracket" variety, one of which was found at the under side of the skull.

Burial No. 62. This burial must be considered in a synecdochical sense, a part for the whole. Presumably a skeleton wrapped in fabric of some sort and still further enclosed perhaps in hide, had been placed at the bottom of a grave about 35 inches deep. On the burial had been thrown very hot clay, filling the grave, which was 2 feet wide, to a depth of 11.5 inches. This clay, which the fire had turned red, had been sufficiently hot thoroughly to char the materials wrapped around the bones and the bones themselves, but had not been sufficiently heated to discolor the clay on the sides and the bottom of the grave. The bones and enveloping material at the base of the pit had a maximum thickness of about 3 inches. Above them, as stated, came 11.5 inches of brick-red clay, on top of which, to the surface, was the ordinary soil of the elevation.

Now, unfortunately, there remained in the ground but a section of the burial from which to draw conclusions, one grave having cut away the burial under description from the lumbar vertebræ up, while another grave, intersecting, had removed the skeleton from the pelvis down. There remained, then, to indicate the form of burial, but the pelvis, the lumbar vertebræ, and part of the forearm bones of the right side. Above these were sections of the grave as described.

This use of hot clay in connection with burials has been fully described in our account of the mound on the Bennett Place, Marion County, Tenn.

Burial No. 63, a child, 15 inches down, having a small, rude, stone disc at the chin and another at the right of the skull, one of slate, one of kaolinized, felspathic rock. Fragments of a shell gorget lay on the thorax.

Burial No. 65, the bones of a child, lying at a depth of 16 inches. Beneath the skull was a triangular arrowhead.

Burial No. 66, partly flexed on the right, the left forearm across the trunk, the head SW.; depth, 26 inches. A small, spool-shaped ear-plug of shell was at one side of the skull, but its mate, for some reason, was not found.

Burials Nos. 67 and 68, each a child having shell beads at the neck, 33 and 21 inches deep, respectively.

Burial No. 69, partly flexed to the right, with both forearms flexed against the humeri, the head SW. At the neck were six perforated pearls used as beads. A small celt of igneous rock was at the left shoulder. At the right side of the skull was a pile of graceful, triangular arrowheads of flint, thirty-two in number, all of which pointed in the same direction with the exception of five which were disturbed by the trowel, but no doubt had coincided in direction with the rest. With the arrowheads was a pipe of indurated clay, in fragments but since put together.

Burial No. 70, partly flexed to the right, with both forearms flexed against the humeri, the head SW.; depth, 37 inches. Under the right femur was a leaf-shaped implement of flint, 7 inches in length.

Burial No. 72, a child, 30 inches deep. Scattered around this burial were eleven small, flint arrowpoints of the usual triangular type found at this place, one beautifully serrated, which probably had been in a deposit with the burial of an adult, the bones of which the child's interment had greatly disturbed.

Burial No. 73, a child, 3 feet down, having near the skull the remains of a shell gorget which probably had swung out from the neck or chest at the time the burial was deposited. This gorget evidently had been attached to a string or strings of shell beads which lay in front of, and at the left of, the skull. Similar beads were found down the left arm and forearm, and along both thighs and legs. These beads, of moderate size, some discoidal, others globular with flattened poles, numbered 530. With them were 383 small marine shells (*Marginella apicina*) which had been pierced for stringing. Immediately under the chin, on the chest, were two discoidal stones, one of quartz, the other probably of some sedimentary rock, each about 1.5 inch in diameter.

Burial No. 75, a deposit of calcined fragments of human bones occupying a space 20 inches by 18 inches and having a maximum thickness of 2 inches, lay 10 inches below the surface.

Burial No. 76, lying partly flexed to the left at a depth of 28 inches, the head N. by W., was a skeleton having between the trunk and knees an inverted bowl, undecorated, somewhat crushed, which had been placed over an upright, undecorated bowl, also crushed when found.

Burial No. 78, partly flexed to the left, the right forearm crossing the pelvis,

the head SSE.; depth, 40 inches. A few inches from the left of the skull, with a small quantity of charcoal, was a deposit of seven celts of indurated shale, ranging in length between 3.25 inches and 9.5 inches, one being somewhat different from the ordinary hatchet or chisel. This tool, slightly more than 6.5 inches in length, is flat on one side and convex on the other, and has, at one end, a cutting edge showing use. The tools in this deposit, which were horizontal and without uniformity as to the direction of the cutting edges, lay parallel to the skeleton and to each other, and were all in contact one with another, or nearly so. The implements had been arranged in two rows, the one nearest the skull consisting of two, one placed above the other, and two lying singly; the lower row being the large celt with two smaller ones in line with each other, beside it, the celts first mentioned in each row being nearest the bones.

Fig. 93.—Pipe of earthenware. With Burial No. 78. Citico, Tenn. (About full size.)

Immediately under this deposit were the remains of a shell gorget of the human-face variety. An earthenware pipe (Fig. 93) showing the conventional beak of a bird, a form prevalent at this place, lay at the inner side of the left forearm.

Burial No. 79, a child buried at a depth of 26 inches. Around the base of the skull lay a necklet made up of six tubular beads of bone, from 3 to 3.5 inches in length, fashioned from wing-bones of birds. This necklet evidently had held suspended an ornament of copper which had deeply dyed green one side of one of the beads. The metal ornament had been made from sheet-copper, circular in the main but having a small projection to accommodate a perforation for attachment. A circular opening in the middle has a diameter of about one inch.

At each ear was a small ear-plug of shell, having a groove to accommodate the encircling lobe of the ear. At the right wrist were four blue glass beads and a few crumbling beads of shell.

Burial No. 80, the skeleton of an adolescent, partly flexed to the right, lay at a depth of 18 inches, the head SE. In the angle between the flexed thighs and the pelvis was a deposit consisting of a flat pebble, roughly circular, about 2.7 inches in diameter, on which rested the remains of a large musselshell; four worked fragments of deer antler, three small, the other with a cutting edge and probably having served as a tool; a stone implement of a widely prevalent type, somewhat resembling a celt but having a blunt edge, and sometimes with a perforation at the upper end; two rude knives of flint.

Burial No. 82, partly flexed to the right, the head SSE., lay at a depth of 32 inches. At one side of the head was a shell ear-plug of the "bracket shape,"

its mate on the opposite side of the skull probably having been broken and thrown out by our digger who came upon the skeleton at the part where the ear-plug would be.

Burial No. 85 had the upper part of the trunk lying on the right side; the lower part and the thighs, which extended in line with the trunk, had been twisted so that they lay prone. The legs were closely flexed back against the thighs. The head pointed SE.; the depth was 20 inches. Above the legs was an undecorated pot, having two loop-handles.

Burial No. 90, partly flexed to the left side, the head directed SSE., lay near to, and at the same level as, the last-mentioned burial of a child whose bones had been somewhat disturbed by the later interment of those of the adult. Scattered at considerable distances apart, near the bones, were fragments belonging to shell gorgets of the type of the human face, which evidently had been broken at the time of the disturbance, as the margins of the broken parts showed the effect of time. Strenuous effort to recover all the fragments was unsuccessful.

Burial No. 94 lay with the trunk on the right side, but owing to the grave being narrow, the legs and thighs were flexed upward to the right. The head was directed WSW.; the depth, 18 inches.

Burial No. 95, the skeleton of a child about three years of age, lying 4 feet below the surface in a grave the beginning of which could not be determined in the comparatively homogeneous deposit of the ridge.

On one side of the skeleton two slabs, one of sandstone, one of limestone, had been placed obliquely over the skeleton, which lay partly flexed on the left side, facing the angle made by the slabs and the ground. These slabs did not rest at the same level as the bones, their bases having been placed 6 inches above the bottom of the grave, the upper margins being about a foot above the bones. The slabs, one of which slightly overlapped the other, provided a covering 25 inches in length. They were irregular in outline, their diameters being roughly about 1 foot 5 inches by 1 foot 2 inches, and 1 foot 2 inches by 1 foot, respectively.

At the neck of the child was a circular gorget of shell, about 2 inches in diameter, without decoration, having a single hole near the edge for suspension. Two small beads, barrel-shaped, were with the gorget.

Burial No. 96 was closely flexed to the left, the head SW., depth 16 inches. A radius having a united break, belonging to this skeleton, has been sent by us as a gift to the Army Medical Museum, Washington, D. C.

Burial No. 97, a child about five years of age, rested on the skeleton of an adult female (Burial No. 98), the head of the child on that of the woman, its body, so far as it extended, on and parallel to the lower burial. The woman's arms had not encircled the child.

Burial No. 98, partly flexed on the right, the head ENE., depth 30 inches. Both upper arms were against the body, as was the right forearm, the left forearm being flexed across the trunk. The skull of this skeleton was preserved.

A few inches from the head was a pot having two loop-handles and a row made up of six small projections encircling the body below the rim.

Burial No. 100, adolescent. The trunk lay on the back, the left arm and forearm along the trunk, the right arm being beside the body, the forearm across it above the pelvis. The thighs were flexed upward, the legs back against them. The head was directed SSE.; the depth was 18 inches. Three tubular, bone beads, each about 1.5 inch in length, were near the skull, which was saved in a somewhat damaged condition, and without the lower jaw, which was not present.

FIG. 94.—Pipe of earthenware. Citico, Tenn. (About full size.)

Here ends the list of burials found by us near the Citico mound, though doubtless many others were left behind, especially in the ridge.

So numerous were intersecting graves in parts of the elevation and consequent disturbances of burials that dissociated objects or artifacts with scattered bones were fairly plentiful in the soil, the following objects having been found in the elevation: a number of triangular arrowheads of flint; shell beads; three undecorated shell gorgets and one with a design partly decayed away; two earthenware pipes, one of which, shown in Fig. 94, belongs to the class representing a

FIG. 95.—Vessel of earthenware. Citico, Tenn. (Diam. 7 inches.)

conventional beak of a bird, noted before at this place; one undecorated pipe of claystone; three undecorated pots of earthenware, one with rude, line decoration, another showing somewhat more ambitious endeavor (Fig. 95); an earthenware trowel, mushroom-shaped; a number of small, discoidal stones, one bicave; two small celts of iron or of steel; a leaf-shaped implement of flint, with part of one edge broken out; a bone tube 2.5 inches in length.

With scattered bones was a group of objects as follows: a bone piercing implement; a small cube of galena, artificially shaped, as the structure does not agree with the crystalline, or natural, cube; a bit of red oxide of iron; two rude or partly-finished arrowheads; a flat pebble resembling a celt in outline; some pebbles and parts of pebbles, of flint; one small mass of limestone.

With other disturbed bones was a deposit of flint arrowheads, unfortunately thrown out and scattered by the digger, from which twenty-two were recovered.

From the soil of the ridge came: discoidal stones and discs of pottery; a bead of bone, nearly one inch in length; a bicave of earthenware;[1] a pipe blocked out of claystone (Fig. 96); the lower jaw of a wolf, having, when found, a bone

FIG. 96.—Pipe blocked out but unfinished. Citico, Tenn. (Full size.)

piercing implement resting upon it; a fragment of earthenware from a considerable depth, the ware being tempered with fine particles of shell and having a superior, yellow slip bearing a decoration in red paint, very carefully conferred. This fragment, similar to one found on the surface, belongs to the same class of painted ware as do the two bowls found in Mound A at the Bennett Place, below Chattanooga (pages 338–352). At the Citico site apparently this fine ware was too highly prized to place it with the dead.

Mound on the Bell Place, Hamilton County.

The Bell Place, of which Mr. James S. Bell, of Hill City, Tenn., is the owner, is just above the union of South Chickamauga creek with Tennessee river. In a cultivated field at this place is a mound within sight from the river, slightly more than 10 feet in height and 60 feet across its circular base. This mound, covered with stumps and trees, had been so greatly dug into in various parts that no investigation was attempted by us. In sight from this mound were

[1] Dr. H. M. Whelpley refers to bicaves of pottery in W. K. Moorehead's "Prehistoric Implements," p. 165.

several slight rises which we were told were what remained of mounds that had been plowed away.

Mounds on the McKenzie Place, Hamilton County.

On the McKenzie Place, of which Mr. R. N. McKenzie, of Chattanooga, Tenn., is the owner, are three small mounds in full view from the southern end of the C. N. O. and T. P. railroad bridge which crosses the Tennessee river at this place. These mounds, never of any importance as to size, have been dug into and plowed away to such an extent that no measurement would give any idea of their original dimensions or shapes. No investigation was attempted.

Mounds below Harrison Ferry, Hamilton County.

Two miles below Harrison Ferry, on the right-hand side of the river, going up, is a group of four mounds, all in full view one from another and from the river-bank. Two of these mounds are on the property of Mr. James Hunter, living some distance back from the river, one symmetrical with circular base, having a diameter of 44 feet, being almost intact. Its height is 7 feet.

The other mound, also circular as to the base, is 48 feet in diameter and 7.5 feet in height, according to our measurement, which is uncertain, as masses of material thrown up by a previous digger have bushes growing over them and can not be distinguished from the mound proper. Permission to dig was not granted.

The remaining two mounds are on the Montgomery Place, which adjoins that of Mr. Hunter and of which Mr. J. H. Montgomery is the owner. The mound farther from the river-bank is 42 feet in diameter and 4.5 feet in height. An excavation about 5 feet by 8 feet was put down in the central part of this mound, passing through part of a former digging. In a portion of the mound not included by our predecessor, at a depth of one foot, was the skeleton of an adult lying partly flexed to the right. Part of a skeleton near this one, and at about the same depth, had been cut off by a former trench. In one part of our excavation was a thin deposit of musselshells (*Unio*) which included a mass of silicious rock in that part of the deposit dug through by us. This deposit of shells was about 32 inches from the top of the mound and seemed to be on what had been the original surface of the ground, though our measurement from the outside made it somewhat more. Cutting through the deposit of shells was a grave-pit, the starting-point of which we could not determine; its base, however, was somewhat more than 5 feet in depth. On the bottom of the pit lay the skeleton of an adult, extended on the back.

In the same grave as the preceding burial was a skeleton almost extended on the back but having the knees projecting somewhat to the right. At the left of the pelvis was the axis of a conch-shell, much decayed.

The other mound on the Montgomery Place had a diameter of 38 feet, the height being somewhat less than 8 feet. An excavation 8 feet 3 inches by 4 feet

9 inches was sunk by us, which passed down beyond a former hole and came to what was apparently undisturbed soil at a depth of 6 feet 8 inches, passing through a considerable deposit of musselshells at one place, mingled with which, without arrangement, were masses of silicious rock, most about the size of a human fist, some larger, some smaller. About 4 feet down was a skeleton flexed to the left, the skull somewhat disturbed, probably by the former trench. Between the thighs lay what had the appearance of a celt of shaly, sedimentary rock, about 5 inches in length, but the cutting edge was wanting, in its place being a surface nearly one-quarter inch in width. Between the legs, together, were three piercing implements of bone; a chisel about 4 inches in length, with pecked surface; and a small celt somewhat broken.

In a grave which extended into the original soil were four burials, all near together, two about 7 feet down, the other two probably 6 inches deeper. With none was artifact of any kind. The forms of burial were as follows: One closely flexed, face down, both forearms flexed back against the upper arms; two at full length on the back; one, extended, face down. An arrowhead of flint was at some distance from the bones.

A small and unpromising dwelling-site at this place was not investigated, owing to its being planted in vegetables.

Mound on the Hixson Place, Hamilton County.

On the left-hand side of the river, going up, about opposite the middle of Dallas Island, is the farm of Mr. Foster Hixson, who resides nearby. On this farm, in sight from the river, is a mound in a cultivated field, which has been practically square, with a flat top. The height is 16 feet, the diameter, about 105 feet, of which 55 feet, approximately, is covered by the summit-plateau. No significant orientation distinguishes the sides or corners of this mound. There is a small site adjacent to the mound, having, however, little but fragments of stone on the surface. Permission to excavate not granted.

Mound at Lovelady Landing, Hamilton County.

On the side of a low hill is a mound in full view from Lovelady Landing, on the property of Mrs. Jane Lovelady, of Pride, Tenn. The mound, in a cultivated field, and itself covered with growing wheat at the time of our visit, is fairly symmetrical. Its height is 6.5 feet; the diameter of its circular base, 50 feet. Owing to the growing crop on the mound no investigation was attempted.

Mound near Lovelady Landing, Hamilton County.

Directly in line from the mound just described, and in sight from it, is a mound in a cultivated field belonging to Mr. Jesse Gann, who lives a little back from Lovelady Landing. This mound, 3 feet 8 inches high and 50 feet in diameter, covered with growing grain when we were there, has been much plowed over and doubtless considerably spread. We were courteously permitted to

put down a hole 6 feet by 9 feet in this mound, which was of sandy clay. Twenty-eight inches down was a deposit of musselshells (*Unio*), which covered much of the base of our excavation, about 6 inches in thickness in the middle parts and tapering at the margin to about half that thickness. This deposit contained here and there nine masses of silicious rock, the largest being about the size of a human head.

This shell deposit rested on a layer of dark soil which evidently represented the original surface, as beneath it was undisturbed ground. This deposit was carefully removed with a view of determining if burials lay immediately beneath or in grave-pits extending into the subsoil, but nothing was discovered.

Beyond the deposit of shells, however, was a skeleton extended on the back, 31 inches down, not in a grave, so far as could be determined, the burial having been placed, apparently, immediately on the original surface of the ground. Another skeleton lay 9 inches above, partly flexed on the right. The heads of these burials were directed toward exactly opposite points. The deeper burial apparently lay on the original surface, and the mound, in being piled above, had included the other burial, as no sign of a pit was discernible in connection with it.

Mound below Igou Ferry, Hamilton County.

About one mile below Igou Ferry, in a cultivated field, in sight from the river, on property belonging to Mrs. Mattie Igou, who lives upon it, is a mound 7 feet 6 inches high as measured by us from the outside, and 52 feet in diameter of base. This mound, which has a circular base, was fairly symmetrical, showing no sign of cultivation or of previous digging. Numerous trees, one of considerable size, were on the mound at the time of our visit.

A central hole, 9 feet by 16 feet at the top and somewhat greater at the bottom, was put down. About 6 inches below the blunt apex of the mound, Burial No. 1 was reached, which lay beneath irregular slabs of stone in the following way: First came two slabs of silicious rock, side by side, 1 foot 8 inches by 10 inches by 3 inches thick, and 1 foot 10 inches by 1 foot by 6 inches in maximum thickness, respectively. Immediately beneath these masses was a slab of limestone 11 inches by 9 inches by 2 inches thick. All these slabs, of course, were of irregular outline. A few inches below the slabs were the remains of a young child having near the head a pot of inferior ware, 3 inches in height, with a margin four times scalloped and below each elevation a small knob. About the neck and on the chest of the skeleton was a profusion of shell beads of various sizes and shapes, the largest ones being barrel-shaped and about .5 inch in length. There were also discoidal beads and diminutive tubular ones, some only about .1 inch long. With these were a few, small, marine shells pierced for use as beads.

Burials Nos. 2, 3, 4, 5 were widely apart in the limits of the excavation at respective depths of 22, 38, 36, and 38 inches, and consisted of, respectively: the decaying remains of a skull; two femora in fragments; teeth and traces of a

skull; a fragment of a femur. All these bones had belonged to adults. They were not, so far as we could determine, in pits.

Burial No. 6, at about 33 inches from the surface, in the central part of the mound but not immediately under Burial No. 1, was a grave-pit 3 feet 6 inches by 4 feet 6 inches, filled with musselshells, with which were mingled large pebbles, fragments of pebbles, masses of silicious rock, and one fragment of limestone. The thickness of this deposit was 10 inches. While the sides of the grave-pit surrounding the shells were clear-cut and perpendicular, it was impossible to say if the pit began with the shells or above them, as the material above the shells was precisely similar to the clay and sand of which the mound was composed.

Under this mass of shell and stone was the skeleton of a child lying at full length on the back, on whose skull had been placed a flat, quadrangular mass of mica schist, 11 inches by 9 inches by 3 inches, which had crushed the cranium. At the neck were many small, marine shells of two varieties (*Marginella apicina* and *Olivella mutica*), used as beads, apparently similar to others found with burials along the river. At the outer side of the right elbow and of the right femur, respectively, was the columella of a conch (*Busycon*), both ends of which, in each instance, had been clearly cut across and not broken. These columellæ probably were material in the rough for the manufacture of beads or of pendants, and probably are the "hearts" of shells such as were carried by Cabeça de Vaca on his journey early in the sixteenth century, to trade with the Indians.

The mound contained no fireplaces and, as we have said, no midden-debris. The upper part was yellow, sandy clay, varying in thickness from 3.5 feet to 4.5 feet; next came from 2 to 3 feet of similar material, though of a slightly darker shade; then the yellow soil of the upper part of the mound. Our excavation was carried through these strata and beyond to a depth of one foot, bringing the depth of the excavation to the measured height of the mound, but no basal line was encountered, nor were two good-sized holes sunk from the floor of our excavation to a considerable depth successful in determining the base.

Seven feet eight inches from the surface of the mound were two badly decayed tibiæ of an adult, side by side, no foot-bones or any other parts of a skeleton being present. These bones seemed to lie in a grave, judging from the fact that around them the soil was somewhat looser than elsewhere. Incidentally, it may be said that it is remarkable for what length of time, in some cases, soil that has been disturbed gives evidence of the fact through a certain lack of compactness.

It is impossible to say how far up the grave had extended, it having been dug down upon by one of our men. With the bones were: a mass of red pigment (hematite), on which rested a celt of slate, about 4.5 inches in length; part of a femur of some lower animal;[1] a tine of stag-horn; a triangular flint point, 3 inches in length; a mass of manganese ore, about 1.5 inches in diameter, ground flat on two faces; an irregular mass of limestone, about 2.5 by 1.5 inches; a rude disc

[1] This bone went astray when submitted for identification.

of the same material, about 2 inches in diameter, pitted on opposite sides; a small flint drill.

Probably the two tibiæ (Burial No. 7) belonged to the same class of interments as did some of the others found in this mound. There is a chance, however, that more of the skeleton was present in the grave and was thrown back by the digger, inasmuch as four arrowheads, together, were found 2 feet from the tibiæ and may have been a deposit with or near the remainder of the skeleton. This, however, is very unlikely, unless the bones were hardly more than powder, as not only was the digger watching carefully, but our entire party as well.

In the mound, apart from burials, were two arrowheads of flint, having stems and shoulders.

On parts of the field surrounding the mound was a slight sprinkling of midden-debris, with which were found four celts, two of them broken, one probably of schistose rock and showing a polished surface only where ground on its rather graceful cutting-edge. There came also from this site a conical pestle and four arrowheads.

Dwelling-site on the Davis Place, James County.

A few yards from the river-bank, on the Davis Place, which is part of the old Thatcher Place and belongs to Mr. J. W. Davis, who lives somewhat farther back toward the hills, is a small, aboriginal dwelling-site, on the surface of which lay some debris. At one end of the site was a slight rise which seemed to have been a place of burial. In addition to bones disturbed by cultivation of the field, part of which the site was, five burials were encountered, as follows:

Burial No. 1, partly flexed on the right, the head SW., 10 inches down. A rude, undecorated pot lay in fragments near the cranium.

Burial No. 2, partly flexed on the left. The skull, which had been struck by a plow, had been directed N. by W.

Burial No. 3, partly flexed on the right, head NE., 18 inches down. Part of a celt lay at the inner side of the right elbow, while under the left arm was a pebble much resembling a celt in outline and probably a mortuary substitute for one.

Burial No. 4, a child, 15 inches down. On the chin, around the neck, and on the back of the head were forty discoidal beads of shell which probably had been strung around the neck but had been displaced when the body was laid in the grave. These beads, varying in size between 1.9 inch and .8 inch in diameter, are pierced through the lesser diameter, so that when strung they were face to face and were found by us in rouleaux.

Burial No. 5, the trunk on the back and thighs extended in the same line, the legs drawn close to the thighs, the feet to the right, the skull ESE., 14 inches down.

Mound and Site on the Eldridge Place, James County.

Going about one-half mile by the road which leads from Eldridge Landing to the nearby hills, one passes the remnant of a mound in sight on the right of the road, in a cultivated field forming part of the property of Mr. J. F. Eldridge, resident on the place. This small elevation had a height of 2.5 feet, a diameter of about 50 feet. Midden-debris and fragments of human bones lay on its surface.

On digging out most of the central part of this mound it became apparent there had been much previous disturbance. Scattered bones, including several skulls, were found, with the bones being two celts, one given to Mr. Eldridge, and one of diabase, 5 inches in length, fairly well made though the cutting edge is not squarely conferred. There were also encountered in the mound six skeletons, the deepest 28 inches down, three of children, and three of adults, all closely flexed on the right, heading respectively S., S. by W., ESE. On the surface of the mound lay a graceful, triangular arrowhead of flint.

On this property, in the level ground, Mr. Eldridge informed us, there had been plowed up recently a human effigy of stone, about 1.5 foot in height, which a tenant had taken to Chattanooga and was, at that time, in that city endeavoring to turn the find to advantage by displaying it in a room to the public, with a charge for admission.

The Eldridge place enjoys the distinction of being the only one on Tennessee river in eastern Tennessee where groups of stone graves of the typical box-grave variety were encountered by us, though, as will be recalled, a single box-grave was found by us at the Bennett Place.

Over various fields on the Eldridge place were scattered sparsely evidence of aboriginal occupancy, including several arrowheads of flint and one of quartz. A short distance from the mound already described, debris of this kind could be seen and much prodding with steel rods was attempted, but the ground being naturally hard, and dry in addition, little effective work could be done. However, one stone grave, 7 inches from the surface, which had in part been plowed away, was found. The grave, 20 inches by 16 inches by 9 inches deep, had a flooring of slabs (as had all the stone graves seen by us at this place), and contained the skeleton of a child closely flexed on the right. About 300 yards ENE. from the mound, in a field of wheat, at the foot of the hills, slabs of limestone, of which material were all the slabs found here, lay on the surface. We were informed that a number of stone graves had been plowed into at this place, the contents of some of which had been examined. We were also informed, though the tidings were not of an encouraging nature, that in all the graves opened on the property, nothing had been found other than bones.

Three stone graves were found here by the use of the rod.

Burial No. 1. The slabs of this grave had been displaced and the bones in the main removed.

Burial No. 2. The top covering of this grave had been plowed away and the sides were down in places. Scattered bones were present.

Burial No. 3. The top and some of the slabs forming the sides of this grave had been plowed away, but sufficient remained to show that the grave, inside measurement, had been 22 inches by 15 inches, by 13 inches deep. On the floor in the center of the grave, lay the skull of an adult, immediately surrounded by the smaller bones and having the long-bones carefully piled on two sides of it and over it. The pelvis was at one end of the grave. All the space in this grave had been utilized, and it was jocularly remarked that there was no room for artifacts.

Two hundred yards, approximately, from the site just described, in an ESE. direction, in an adjacent field of wheat, was another small cemetery, on the surface of which lay a number of slabs where four stone graves were discovered by sounding.

Burial No. 1, 6 inches down, was 35 inches by 2 feet, by 17 inches deep, inside measurement. One end of the grave consisted of a single slab; the other end was made up of two slabs projecting outward and forming an angle in which the head of the skeleton rested. The sides of the grave consisted of one slab each, a small space at one side being filled with fragments. The sides stood erect, but their upper margins were very uneven, so that the top, consisting of four slabs, had fallen in. The burial lay closely flexed on the right, and, for good measure, perhaps, had on the left side, against the slab, the skull of an adult with some of the long-bones of its skeleton, and a femur and a tibia of a child. On the opposite side of the grave, against the slab also, lay a femur of still another adult, making five full-sized femora in the grave.

Burial No. 2. This grave had been disturbed superficially. The burial was made up of detached bones, but no skull.

Burial No. 3, a grave partly plowed away, having a few bones of the skeleton of a child remaining.

Burial No. 4. The top slabs of this grave, which was 2 feet 9 inches by 1 foot 11 inches, by 11 inches deep, and irregular in outline, had been partly plowed away, without disturbance, however, to the contents, which consisted of two bunched burials, each with a skull.

No artifacts were with any burials in the stone graves discovered here by us, hence the record of the place was maintained.

Mounds and Sites on Hiwassee Island, Meigs County.

Hiwassee Island,[1] the property of Mr. and Mrs. P. D. Benham, who reside upon it, is about two miles long and one mile wide.

[1] Cyrus Thomas, "Catalogue of Prehistoric Works," p. 209. Hiwassee Island is described under the name of Jolly's Island, which it probably bore at one time, and twenty-four mounds are referred to as upon it, which might well have been the case, long ago, when the island was visited by Mr. J. W. Emmert, on whose information the statement is based.

This island, as to which there is a report respecting the finding of a stone image, has an added interest as being the starting point of a great chain of groups of comparatively low, conical mounds extending up Tennessee river to Lenoir City, a distance of 101 miles by water, as we have stated in the Introduction.

At the extreme upper end of the island, and in sight from most of it, is a mound (A) 22.5 feet in height,[2] which probably has been square or nearly so as to its basal dimensions, but at present, through wash in periods of high water, its outline is irregular. Its basal diameter is 136 feet, 58 feet of which are under the summit-plateau, which is flat, wooded, including an oak-tree of great age, and gives no indication of ever having been under cultivation.

At various distances apart, extending down the island, not in line, are three mounds, B, C, and D, while near together, toward the lower end of the island, are two mounds, E and F. There are also scattered over the island various humps and rises and parts of mounds that have been mostly plowed away. The more important of these mounds have dimensions as follows:

B, elliptical; 10 feet 3 inches in height, 63 feet by 48 feet in diameter.

C, circular; height, 8 feet 2 inches; diameter, 48 feet.

D, circular; height 9 feet 2 inches; diameter, 45 feet.

E, circular; height, 5 feet 7 inches; diameter, 30 feet.

F, circular; height, 9 feet 10 inches; diameter, 54 feet.

As the owners of the island take great interest in archæology, and desire, so far as possible, to preserve intact the mounds now on their island, none of those herein particularly described has been plowed over or dug into to any appreciable extent, excepting, of course, the one (E) investigated by us.

Mounds E and F were kindly placed at our disposal, but as we doubted our ability to restore the larger mound to its original condition in the time at our command (the prevailing low water of the river having been a great source of delay to us), we decided to devote our attention to Mound E exclusively.

To avoid disturbing trees, an excavation 10 feet long by about 6 feet wide was made somewhat away from the center. The mound was composed of sandy clay of a brown shade. Thirty inches down a fragment of decaying bone about one inch in length was encountered. Other than this fragment, no bones were discovered in the mound, nor was any fireplace or midden-debris found in the digging.

At a depth of 5 feet 10 inches an indistinct basal line was discovered, beneath which was undisturbed, yellow clay.

Not central in the excavation, but nearly so as to the base of the mound, a pit was discovered, 3 feet by 3 feet 4 inches, extending one foot into the yellow clay and filled with the brown soil of the mound. How far this pit extended

[2] In the 12th Annual Report of the Bureau of American Ethnology, p. 405, this mound is given as 35 feet in height, or about 12 feet more than the correct measurement. We would not refer to this error, which is very likely typographical, were it not that we are on record in this report as saying that the mound at Florence, Ala., is 42 feet in height, no other mound on the river approaching such a figure.

into the body of the mound, if at all, could not be determined. The contents of this pit were removed with the utmost care with the aid of a trowel, having in view the possible presence of a burial, but not even the crown of a tooth was unearthed.

Together, on the base of the pit, in a little pile, were: a hone of sandstone, elliptical in outline, 4.5 inches by 3.5 inches; a pebble-hammer, discoidal, 2.25 inches in diameter; a triangular point of flint, about 2 inches in length; an object of slate, about 5 inches long, resembling a celt but having a rounded, blunt edge and possessing on one side, at one end, a lustre, as if conferred by wear; a similar object of slate, slightly more than 3 inches long, having lost a part of one end through an unsuccessful attempt to make a perforation, and having a depression below the fracture where another hole had been attempted; still another object of slate, of the type of the foregoing, 3.3 inches in length, this one, however, having a perforation at one end.

In the neighborhood of Mound A are extensive dwelling-sites with considerable debris on the surface; but this being pasture land, the sites were not subject to investigation. Mr. Benham informed us, however, that some time ago his son and a companion had dug extensively in the sites, finding many burials with accompanying artifacts. A portion of the objects discovered was inspected by us at Mr. Benham's home on the island, and while the objects are of much interest as illustrating the aboriginal culture that prevailed on the is and, the collection contained nothing notable, the pottery being of inferior ware and of inferior form, while no object of flint of exceptional interest was present. The only engraved shell gorget in the collection bore the triskele surrounded by the conventional rattlesnake. Glass beads and objects of brass also were present.

Mounds near Armstrong Ferry, Meigs County.

Mounds on property of Mr. A. F. Armstrong, living near them. Two about one mile below Armstrong Ferry, 200 yards apart approximately; one about one mile above the ferry: all in open fields. The dimensions estimated by our agent, an expert judge of the matter, are, respectively, basal diameter 40 feet, 50 feet, 40 feet; height, 6 feet, 9 feet, and 8 feet. Permission refused.

Mounds near Mouth of Mud Creek, Rhea County.

Mound at the lower side of Mud creek, one-half mile NNE. from the mouth, and 100 yards N. from Mud creek, 40 feet by 40 feet by 6 feet. Three hundred and fifty yards N. from the first mound, in open field, is another, 40 feet by 40 feet by 7 feet. At the river, just below the mouth of the creek, a campsite. Mounds visited by our agent and dimensions estimated by him. Owner, Mr. Summerfield Fisher, resident on the property. Permission not granted.

Mounds near Gillespie Landing, Rhea County.

Near the river, on the Gillespie Place, belonging to Mr. J. W. Gillespie living about 1.5 mile back from the landing, are two mounds about one mile apart,

5 feet and 6 feet in height, respectively, and each about 40 feet in diameter, according to the estimate of our agent. Permission refused.

Mound near Hoyal Ferry, Rhea County.

About one-quarter mile westerly from Hoyal Ferry, in a cultivated field, on property belonging to Mrs. Harriet W. Hoyal, of Spring City, Tenn., is a mound 5 feet 9 inches in height and 35 feet in diameter. The mound had been trenched into from two sides and some of the margin had been plowed away, but much of the mound still remained intact.

Nearly centrally we put down a trench 12 feet 6 inches in length, and averaging about 7 feet in width. A short distance down were fragments of human bones in the old digging, and a knife or an arrowhead, of flint, also a triangular point of black flint, about 3.5 inches in length.

The digging continued through the brown soil which composed the mound without reaching fire place or burial, until at a depth slightly more than 6 feet small parts of a human skull were discovered, with remains of teeth. At a distance from where the skull had been, with no bones intervening, were decaying fragments of two femora, side by side, the space between which and the skull being about what would be expected to accommodate the remains of the trunk. Farther along no trace of leg-bones or of the feet were discovered. Near the skull, or what was left of it, was considerable red pigment and the following objects grouped together: two piercing implements of bone, in fragments; a disintegrating mass, probably what remained of a hoe of sandstone; a small triangular point of flint; a graceful arrowhead, resembling a drill, also of flint; a celt of shale, about 4.3 inches in length; a tool of shale, of the kind found by us in the mound at Hiwassee Island, 4.5 inches long and 1.4 inch in width, having a curved, blunt edge at one end and a perforation about .75 inch from the other end. We speak advisedly of this implement as a tool, since the blunt edge gives evidence of the fact, being rubbed and striated on half of each side.

At a depth of 6 feet 6 inches, compact, yellow clay was encountered, evidently previously undisturbed. No base-line was distinguishable, and the bottom of the mound probably had been somewhere between the yellow clay and where the burial was found.

Three intelligent boys, sons of the tenant cultivating this place, said that a man traveling down the river in a house-boat in search of antiquities (the agent of a dealer, no doubt) recently had visited the place and had bought from them all the "Injun spikes" they could find for him on the surface. They added the significant information that the man also was acquiring quantities of fragments of flint.

Mounds on the Spence Place, Rhea County.

About one-quarter mile back from the river, on the Spence Place, Mr. Albion Spence, owner and resident thereon, on the beginning of the slope of the hills, some in sight from the river, others masked by light woods at the time of our

visit, are six mounds. These mounds, parallel to the river in an irregular line, seemed to be from 5 to 9 feet in height and from 30 to 50 feet in diameter of base, the smaller ones having been under cultivation and doubtless reduced in size. Permission not granted.

Mound on the Jones Place, Meigs County.

About one-half mile in a straight line from the landing at the Jones Place, from which it is visible, was a mound 5 feet 2 inches in height and 37 feet in diameter, on property belonging to Mr. J. P. Hegler, of Decatur, Tenn.

The mound, in a cultivated field, did not seem to have been plowed over, and the presence of large trees upon it prove that no cultivation could have taken place there for a long period.

Fig. 97.—Spearhead of flint. Jones Place, Tenn. (About full size.)

Previous to our coming, a trench about 8 feet across had been carried into the mound, but digging had been discontinued some distance from the center.

A central excavation 11 feet by 12 feet was sunk by us, which included but a small part of the previous digging. Fourteen inches from the surface a mass of limestone was reached which projected above a number of other masses—not slabs—with which it was, and at a depth of 3 feet 5 inches was a group of similar masses of all sizes and shapes, some having thrice the bulk of a human head or more, some much smaller. These two groups evidently had been arranged with some definite design as to shape, but the upper group had been disturbed by an excavation of which there was no evidence on the surface of the mound, and in which we found a fragment of a glazed jar, while part of the lower group had been cut away by the trench we have described. Consequently, we were unable to form a definite idea of the original arrangment of the masses.

The loamy material of which the mound was made, which lay under these masses of rock, was examined by us with the utmost care down into the yellow, undisturbed clay which underlay the mound at a depth of 5 feet 10 inches. No

trace of bones or of artifacts was discovered, however, nor was there any sign of a pit extending below the base.

Off at one side of our excavation—the side farthest from the masses of rock—a grave 6 feet 9 inches long by 4 feet wide, the major axis about due E. and W., was discovered, the brown loam of the mound extending into the undisturbed underlying clay to a depth of about 1 foot 9 inches. On the base of the grave were particles of charcoal, and on both sides, but not at the ends, were masses of charcoal and ashes, as if there had been a fire preliminary to the placing of a burial and the coals and ashes had been swept to each side to make way for it.

The entire contents of the grave was slowly sliced away with a trowel and resulted in the discovery of traces of leg-bones, and remains of two femora, apparently in anatomical order and not visibly affected by fire. Alongside one of the femora was a graceful weapon of flint (Fig. 97), notched on each side for hafting, which we recognized to be of a rare type. Dr. H. M. Whelpley writes us: "The broad, notched flint is uncommon in shape and the notches are rare as to position. I do not find in my collection a piece which I can call similar." Mr. Charles C. Willoughby kindly has sent us a tracing of a much smaller point than ours, but of the same type, which is in the Peabody Museum collection. It came from Chichen Itza, Yucatan.

Mound on the McDonald Place, Rhea County.

Mound in sight from landing on the McDonald Place; owner, Mr. Joseph McDonald, Dayton, Tenn. Height and diameter of mound, respectively, 7 feet and 50 feet (estimated). Permission not granted.

Mounds near Cook Landing, Rhea County.

On the estate of Mr. M. G. McDonald, residing nearby, are three mounds in a cultivated field, in line and but a short distance apart, all in sight from Cook Landing, and another mound in the same field, nearly half a mile easterly from the northernmost mound of the three.

Mound A. The southernmost, 3 feet 3 inches in height, 50 feet in diameter, much spread by cultivation. A hole 12 feet by 12 feet was put down, reaching a base-line at a depth of 4 feet and coming upon traces and fragments of bone at various depths.

Mound B, a remnant next in order, 1 foot 9 inches in height and 40 feet in diameter. Digging came upon parts of a skull.

Mound C, slightly more than 7 feet in height, with a diameter of 42 feet, had never been under cultivation, but unfortunately it had received the attention of previous diggers who had left a circular hole centrally in the mound, about 6 feet in diameter and reaching almost to the base. In the side of the mound also had been an excavation about 9 feet by 7 feet, probably reaching to the level ground. A central excavation 12 feet square was carried by us to a depth of 7 feet 5 inches, where undisturbed yellow clay was encountered, the base of

our excavation being thoroughly cleaned out in a vain search for pits. On the base, however, was some charcoal which we at first thought might indicate the presence of a burial beneath, but the material lay on the same yellow clay which was under the mound.

One foot from the surface was a skeleton much decayed, lying partly flexed to the left. Twenty inches down were some bones disturbed by the previous hole in the center. At a depth of 5 feet 9 inches lay a decaying skull alone. A skeleton partly flexed on the left lay at a depth of 6 feet 4 inches.

Two feet down, together, were two bowls of inferior, porous ware, without decoration. No human remains were found near this pottery, but possibly they were removed during the former excavation.

Dissociated in the soil was a carefully-smoothed celt, 6 inches in length, without a cutting edge.

Mound D, evidently long under cultivation, having a circular outline of base, had a diameter of 100 feet, a height of 6 feet. Regarded from the lower part of the slope on which it is, the mound seems considerably higher. As it had become evident to us that all the mounds on our list could not be dug into in a season's work, an investigation of this mound was not attempted. Around it had been an extensive dwelling-site, judging from the dark soil and from some midden-debris on the surface, on which several arrowheads and discs of pottery and of stone were picked up. Considerable digging in this site came upon one skeleton, which lay partly flexed on the right, 21 inches down.

Mounds near Viniard Landing, Rhea County.

Viniard Landing is about one mile above Cook Landing, and is also on property of Mr. M. G. McDonald, whose mounds at Cook Landing have just been described. We learned that Mr. McDonald hitherto had objected to any digging into his mounds, not desiring to have them disturbed by other than scientific exploration. All of Mr. McDonald's mounds were cordially placed at our disposal, a courtesy which the Academy greatly appreciates.

About one-quarter mile following the road in from Viniard Landing, which there traverses a cultivated field, in the verge of woods, all but one visible from the landing when foliage does not intervene, are six mounds, three near together and forming a triangle (A, B, C), and three others (D, E, F) a short distance apart and comparatively near the three mounds just described. About one-quarter mile NE. from Mounds E and F are two others (G, H) in a cultivated field and having themselves been plowed over and planted upon.

Mound A, the first visible going upstream and the most westerly of the triangle, was slightly less than 5 feet in height and 35 feet across its circular base. But little previous digging had been attempted in it.

An excavation 12 feet by 14 feet reached yellow clay at a depth of 4 feet; presumably wash of water had removed soil to the depth of a foot from around the mound.

Twenty-five inches down was a skeleton, much decayed, partly flexed on the left, the head W., and in another part of the excavation the skeleton of an adolescent lay partly flexed on the right, the head S. One of these burials seemed to be in a grave and the other probably was also. It was dug down upon by one of our men before this question was determined.

About centrally in the base of the mound was a pit, 4 feet in length, extending 6 inches into the yellow, undisturbed clay. The width of this pit was not ascertained, as the margin of the grave was partly dug away before its presence was noted. Though the digging was closely watched, it is possible that part of the burial was removed, as the remains, of which only a skull was found, were hardly more than a trace.

Mound B, 110 feet about E. from Mound A, 9 feet 9 inches in height, 60 feet across its circular base. No sign of previous digging.

Mound C, 100 feet NE. by E. from Mound A, 12 feet in height, base circular, diameter, 73 feet. A large trench had been dug in from the eastern side.

Mound D, about 270 feet E. by N. from Mound B; height, 6 feet; diameter of circular base, 42 feet. This mound had been dug into to a slight extent. A large tree on top and others on the slope made the mound a mass of roots.

Mound E, 50 feet NE. from Mound B; height, 9 feet; diameter of circular base, 50 feet. It is encircled by a well-defined ditch slightly more than one foot deep. The mound forms a very symmetrical cone, slightly truncated. A trench had been dug in from the eastern side prior to our visit.

Mound F, 120 feet N. from Mound E; height 5 feet 4 inches; elliptical base, 40 feet by 48 feet. Two small previously-made holes were noted, one in the summit, the other in the side.

A hole 12 feet by 12 feet was sunk by us, which soon passed beyond the small hole referred to and reached yellow clay, which was encountered 5 feet 2 inches below the top of the mound. No sign of burial or of artifact was encountered in the body of the mound, which was made up of two layers, the upper one of yellow, loamy clay, about 2 feet thick, and the lower one of brown clay containing some sand about 3 feet in thickness. No pit had cut into the light-yellow layer from the surface, nor had any grave originating in that layer extended into the brown stratum below it.

The base of the mound was scraped clean by us, showing yellow, undisturbed clay all over, except at one place where a grave 7 feet 6 inches long by 4 feet 2 inches wide extended one foot into the otherwise undisturbed soil. This grave, which was not central in the base, but commenced at about the center and lay ENE. and WNW. (the same direction as the major axis of the mound), the eastern end being the one away from the center, had been dug only from the original surface down and then the mound had been built upon it. This was evident because at each side of the grave was piled the yellow clay dug from it originally, while the grave itself was filled with the brown material composing the lower stratum of the mound.

On the upper part of the grave, somewhat above its base, at one side, was a deposit of charcoal, and a small amount of the same material was at one end of the grave, also near its upper surface. In neither instance did the clay near the charcoal show any mark of fire.

The entire contents of the grave were removed by hand with a trowel, the material being carefully sliced away under critical examination. Near the middle of the grave was the faintest trace of what may have been a small part of a single bone. No artifact was present.

Mound G, 10 feet 3 inches high, 65 feet across the circular base. A surprisingly symmetrical mound, and especially so in view of the fact that it has been under cultivation. No previous digging was apparent.

Mound H, 138 feet ESE. from Mound G, 7 feet high, 50 feet in diameter of base. No former digging was noticeable.

A hole 12 feet by 12 feet was put down. The mound differed from others at this place in that, especially in the lower parts, it contained many irregular local deposits of material of a darker color than was that of the rest of the mound. These deposits were not in layers, but seemed to have been brought from a place other than where the rest of the soil had been taken, perhaps from a swamp which is nearby. In digging from above these deposits of dark material were misleading, as they seemed to indicate the presence of graves.

Burial No. 1. In a grave apparently was a burial 32 inches down, at full length on the back, head W. by S. At the left of the pelvis was a flint knife with shoulders, a considerable part of whose pointed end had been broken off. The margin of the fracture had been chipped to confer a cutting edge. Five fragments of the columella of a conch, much decayed, were at the neck, two at the left elbow, one at the left hand.

Burial No. 2. A skeleton closely flexed on the left, head S., was 5 feet 10 inches down, seemingly in a grave.

Burial No. 3, a skeleton partly flexed to the left, the head WNW.; depth 7 feet.

Burial No. 4, at one corner of the excavation, partly flexed to the left, the head SW. by W., very badly decayed. At the pelvis of the skeleton was a small arrowhead of flint. This burial lay at a depth of about 8 feet, and probably was on the original surface, but when it was discovered heavy rain was falling and had been for some time. The base of the excavation was a mass of mud and remained so during the time our work in the mound continued. Consequently determination as to the exact base-line of the mound was not possible.

Incidentally, it may be asked why digging is not postponed in mounds when conditions arise interfering with thorough investigation. Postponement in investigation of mounds in a region where visitors are numerous is inadvisable, especially when the work is nearing the base, as outsiders are likely to finish the digging in one's absence.

Burial No. 5, partly flexed to the right, the head SW.; depth, 8 feet.

Dissociated in the mound were two or three small arrowheads or knives, of flint.

Mound on the Luty Place, Rhea County.

The Luty Place adjoins that of Mr. McDonald and belongs to Mrs. James Luty, of Rhea Springs, Tenn. This mound, in view from the landing, has been plowed out of shape by long-continued cultivation. Its height at the time of our visit (when it was covered with a growing crop) was 6.5 feet; its diameter, about 90 feet. The obstacle to investigation encountered at this place, namely, the presence of growing grain, while resulting in no inconvenience in this instance (as the mound, which seemed to have had a flat top, presumably had been a domiciliary one, and, moreover, seemed practically to form part of a group we had no desire to expend additional time upon), was one we had to face from this time, about April first, until the end of the season.

Mound on the Keyforver Place, Rhea County.

On the crest of a low hill overlooking the river, on the verge of woods, is a mound on the property of Mrs. Ellen Kyle, who lives upon it, which is visible from the water when the foliage does not obstruct the view. The mound, never under cultivation, on a slope, depends considerably, as to its height, on the point from which measurements are taken, one about midway on the slope giving an altitude of 4 feet 8 inches. The diameter of base is 45 feet.

A hole, 10 feet by 10 feet, showed the mound to be of yellow clay of almost the same color as the underlying ground. A line, seemingly that of the base, was encountered at a depth of 4 feet, and on it a small amount of charcoal was found. No artifacts or bones were discovered, though the bones, presumably, had disappeared through decay.

Mounds on the Kimbrough Place, Rhea County.

The Kimbrough Place, belonging to Mr. R. B. Kimbrough, who lives upon it, is on the left-hand side of the river, going up, opposite Piney Island.

Shortly after passing the lower end of the island a remnant of a mound is visible in a cultivated field on the Kimbrough Place, possibly a foot in height and 40 feet in diameter. From it, we were informed by Mr. C. C. Brown, who lives nearby, two similar objects of copper, one of which subsequently was lost, were plowed up by his sons. The other, obtained by us from Mr. Brown, is a ceremonial axe, such as were found by us in considerable numbers at Moundville, Ala., and especially resembles those referred to in a previous report.[1] These ceremonial axes, made of native copper hammered in the usual way, on which parts of the wooden handles in some instances remained in place when found, resemble long chisels with flaring edges, the edges, however, bearing ceremonial notches.

[1] "Certain Aboriginal Remains of the Black Warrior River," Journ. Acad. Nat. Sci. Phila., Vol. XIII, pp. 154, 157, 162, 163, 173; Figs. 28*A*, *B*, 33, 61.

The axe obtained from Mr. Brown, which had been badly battered since its discovery, is 10 inches in length and slightly more than .25 inch in maximum thickness. The flaring blade (on which traces of notches are still visible) is about 1.5 inch in width, while the opposite end is .5 inch wide. The weight is twelve ounces.

An employee of Mr. Kimbrough, the owner of the property, also plowed from this mound, according to Mr. Kimbrough, a ceremonial axe of native copper, of the same kind as the other, which Mr. Kimbrough values highly and has preserved in perfect condition. The length of the axe, which we carefully inspected, is 16.75 inches; its maximum thickness about .2 inch. The minimum width, which is at the end opposite the blade, is .17 inch. At the union of the flaring blade with the body of the axe the width is .9 inch; and that of the blade, on which are thirteen notches, is 1.5 inch.

Later we saw a son of Mr. Brown who showed us a bicave of quartz, with central perforation, very symmetrical, about 6 inches in diameter. This handsome specimen, which we were told had been plowed from the mound from which the ceremonial axes were taken, was in use as a soap dish.

We also obtained from Mr. Brown, as having come from the place, though there seems some uncertainty as to just what part of it, a small celt, a grooved axe, and what has been called an anvil-stone, similar to one figured by Thruston.[1]

Farther along, in an adjacent field on the Kimbrough Place, is a mound in sight from the landing, which has been largely plowed away. Its height was 3 feet 4 inches; its diameter of base, 47 feet. On the surface are many slabs of fossiliferous limestone and some fragments of human bones.

This mound, which was made up of clay mixed with sand, was suitable for the use of a sounding-rod, which was freely employed. In addition, trial-holes were put down throughout much of its higher parts. Fragments of a skull were found in two instances, near the surface.

At a depth of 13 inches was a stone grave differing from those found by us so far, in that the burial lay between horizontal placements of slabs but having none on the sides and at the ends. A much-decayed skeleton lay closely flexed to the right, the head WNW., the right forearm flexed up to the shoulder, the left forearm lying across the body. On the skull was a small slab of limestone (all slabs from this place were of this material), and a long, narrow slab lay across the upper part of the thorax. A third slab was over the pelvis and lower extremities.

Beneath the skull and the upper part of the thorax lay a slab; another had been placed beneath the trunk; a third was under the pelvis and extremities.

All the slabs in connection with this burial had been carelessly placed, there having been no attempt to avoid leaving open spaces, of which there were a number.

In two places in this mound were two lines of slabs arranged in a slanting

[1] *Op. cit.*, Fig. 172.

position. These, beyond doubt, had formed parts of graves of a kind we found in another mound at this place. The graves in the mound under description had been largely plowed away. No trace of bones remained near the slabs.

On the line between the Kimbrough Place and the property of Mr. C. C. Brown, which adjoins it, is a mound visible from the river-bank. This mound, about evenly divided by a fence, has a diameter of about 45 feet. The height of the southern half, which is on the Kimbrough Place and has not been under cultivation, is about 5 feet 8 inches. The other portion, long plowed over, and covered with growing grain at the time of our visit, is considerably lower.

Our investigation was first directed to the southern side of the mound, on which were some trees of rapid growth (poplar) and from which a marginal part had been plowed away, though, as we have stated, this side of the mound had not been plowed over. Many slabs which had been unearthed in the plowing, lay around.

In an excavation in the middle of this southern half of the mound we found a pile of bones in no anatomical order, at a depth of 14 inches, which may have been a bunched burial or an aboriginal disturbance, as near it, but lower, was a stone grave without slabs at the sides, ends, or bottom.

Twenty-eight inches down was a skeleton partly flexed to the left, the head W., the partial flexion of the remains causing the knees to project from the line of the body. Above the skeleton had been placed an oblong arrangement of two thicknesses of flat fragments of limestone in line, all small or of moderate size, from a side of which, at right angles, was a projection of similar slabs arranged to cover the knees, the entire covering, however, being in excess of the area required to protect the skeleton.

Also in the southern part of the mound, 22 inches down, lying partly flexed to the right, the head NW., was a skeleton with no slabs in association.

Not far from the other was an interesting form of stone grave in the shape of a right angle composed of a single thickness of slabs unevenly placed. These lay nearly 3 feet from the surface, above the skeleton of a child, partly flexed to the right. Covering this skeleton, or nearly doing so, for part of the skull was exposed, was one side of the angular grave, having a length of 42 inches, a width of 22 inches. A head-piece had been placed about vertically. Slanting down from this head-piece was a slab covering most of the skull, the rest of the skeleton being protected by two other slabs in a horizontal position.

From the head of the line of slabs was an extension at right angles, 2 feet in length and 17 inches in width, made up of single slabs. The purpose for this extension was not apparent, inasmuch as no part of the skeleton projected beyond the line of its covering slabs, the part of the skull exposed being so through an irregularity in the shape of the slab immediately above it. No sign of bones or of artifacts lay beneath this extension.

In the northwestern, or cultivated, part of the mound, was a burial of a new variety so far as our experience along the Tennessee extends. It is interesting

to compare, however, the description of an almost identical form of stone grave found in Ohio,[1] the illustration given therewith very closely resembling the grave discovered by us.

Near the base, yet not far from the surface, as it was away from the center of the mound, was a rude flooring of slabs, horizontally placed except two, which were upright, having been thrust in to fill small gaps. This flooring, which was roughly circular, was about 6 feet in diameter. Next a kind of enclosure had been arranged around the flooring, made up of large slabs on edge, in double thickness, sloping outward, and projecting upward, a few inches on an average, above the stone pavement. The basal diameter of the whole grave, still irregularly circular, was about 11.5 feet.

About centrally on the floored space lay a skeleton partly flexed on the left, the head ENE. No sign of slabs or of masses of rock was above the grave.

In the northeastern part of the mound, 28 inches down, not far from the base, slabs had been piled horizontally, often with small spaces between, in one thickness usually in the outer parts of the flooring, but in two, three, and even four thicknesses elsewhere. The flooring, however, was level on the whole, at places two or more thin slabs being used to equal a thicker one.

The outline of the flooring, which was not surrounded by slanting slabs as in the preceding case, was somewhat irregular, ranging between 8 and 9 feet in diameter.

Near the center of this flooring, above which were no slabs or masses of rock, was the skeleton of a child.

But one part of this interesting mound was left unexplored, the outer, northern portion, where it is unlikely undisturbed burials would have been found.

On the Kimbrough Place, superficially, flint points were numerous, most of them probably knives, and showing little care in their manufacture. A few slender and graceful, triangular points of flint were found, however, the two basal angles projecting downward slightly. One rude arrowhead of quartz also was found.

Mounds on the Wheelock Place, Rhea County.

There are four small mounds on this place, the largest about 6 feet high and 50 feet in diameter, in sight from the landing. Owner, Mr. W. E. Wheelock, Chattanooga, Tenn. Permission not granted.

Mounds on the Garrison Place, Rhea County.

Two mounds on this place, in full view from the river, each about 9 feet high (estimated), have been considerably dug into, resulting in the discovery of bones only, we were informed by the owner, Mr. J. E. Garrison, who lives on the place. We decided to make no investigation here.

[1] Gerard Fowke, "Archæological History of Ohio," p. 402, Fig. 128.

Mounds on the Lower Hampton Place, Rhea County.

On the Lower Hampton Place, belonging to Mr. Walter Hampton, of North Chattanooga, extending for some distance along a ridge, as a rule, sometimes in pairs or in groups of three, some in woods, some in cultivated fields, are fifteen mounds, the largest, 9 feet in height and 65 feet in diameter. All these mounds are of the type common in this region, namely, the blunt cone.

One of these mounds, on the flat crest of a ridge, a short distance back from the river, about 30 feet from another mound, was 4 feet in height and 40 feet in diameter. A hole 12 feet square was put down, reaching at a depth of 40 inches a decaying skull with no trace of other bones.

About 4 feet 9 inches deep undisturbed red clay with pebbles was reached. The entire base was carefully searched without discovery of any burial or further trace of human remains.

Mounds at Euchee, Meigs County.

At Euchee are two mounds belonging to Mr. J. P. Celvahouse, of that place. These mounds, of the usual shape, estimated by our agent to be 12 feet and 4 feet high, with diameters of 75 feet and 50 feet, respectively, are used in time of high water to store goods upon, thus saving their transport to the hills; consequently, digging into the mounds was not desired.

Mounds on the Upper Hampton Place, Rhea County.

On the Upper Hampton Place, belonging to Mr. Walter Hampton, a number of whose properties we have described in this report, are five mounds in an irregular line, but a few feet apart, none of which has been under cultivation. Taking these mounds in order, beginning with the most northerly one, the heights are: 6 feet 9 inches; 9 feet 8 inches; 15 feet 9 inches; 10 feet 2 inches; 6 feet 4 inches. The diameters of the circular bases of these mounds, taken in the same order as the heights, are: 55 feet; 60 feet; 85 feet; 55 feet; 50 feet. Numerous slabs, unquestionably from stone graves, lay upon one of them.

Selecting the smallest mound for investigation, a hole about 11 feet square reached the base-line at a depth of 4 feet 4 inches, showing that the mound had been increased in height, presumably by the washing away of adjacent ground, which could readily be the case, the mound being on a slope.

Not far from the center of the excavation, on the dark material marking the original surface of the ground, were remains of a skull, no other bones being present. With the skull was part of the columella of a conch-shell.

At one corner of the excavation were remnants, here and there, of bones which, from their position, indicated they had formed part of a skeleton lying at full length. Near the skull were two parts of the columella of a conch; two similar ones had been placed near where the left shoulder had been.

Extending over a number of acres along the river, at the Upper Hampton Place, is an aboriginal dwelling-site, now a cultivated field, having on the surface

considerable debris, including bits of pottery, some having crude, incised decoration of parallel and crossed lines.

There were gathered from the surface, besides some graceful, triangular arrowheads and many carelessly-made ones, all of flint: a hatchet and part of another one; small discs of pottery and of stone; a tubular bead and a small boss of brass; a flint knife. A very careful search conducted by nine persons failed to find any trace of human bones on the surface, and a limited amount of digging and sounding with the rod were unsuccessful in discovering burials.

Mound near Red Cloud Ferry, Rhea County.

Near Red Cloud Ferry, on property belonging to Mr. William E. Wheelock, of Chattanooga, is a mound about 5 feet high and 40 feet in diameter (estimated). Permission not granted.

Mounds on the Hope Place, Rhea County.

On the property of Mr. H. R. Hope are three mounds visible from the river, ranging between 7 and 9 feet in height, each about 50 feet in diameter (estimated). Though Mr. Hope kindly placed these mounds at our disposal, the low water prevailing in the river prevented our approach within a distance convenient for conducting the investigation.

Mounds on the Cagle Place, Rhea County.

On the property of Mr. W. N. Cagle are three mounds, all between 5 and 6 feet in height and with basal diameters between 40 and 50 feet (estimated). Permission not granted.

Mounds near Jackson Ferry, Meigs and Roane Counties.

On the property of Dr. and Mrs. T. L. Smith, of Harriman, Tenn., are fourteen mounds, to investigate which we were unable to obtain permission. In ascending the river one comes first to a mound about 10 feet in height in sight from the bank. Farther along is one about 3 feet in height and opposite the mouth of White creek is another 5 feet high, approximately. These mounds probably are in Meigs County.

A short distance in from Jackson Ferry, on the Smith property, some of which are in sight from it, are five other mounds in line and but short distances apart, the largest having a height of about 5 feet.

Farther back on a hill, on the extremity of a ridge, in woods, is a very interesting group of six mounds, all near together, all very symmetrical and nearly of the same size, the largest being 16 feet in height and 80 feet in diameter.

Mounds on the Fitzgerald Place, Roane County.

On the Fitzgerald property, belonging to Mrs. Elizabeth Fitzgerald, of Rockwood, Tenn., are seven mounds between 6 feet and 11 feet in height. Permission to dig not granted.

Mounds on the Campbell Place, Roane County.

On the property of Mr. E. F. Campbell, of Cleveland, Tenn., immediately opposite Half Moon Island, are six mounds a short distance back from the river, the smallest mound of the group, immediately in from the landing, being 5 feet in height and 35 feet in diameter.

A short distance from this mound are four others, almost in a straight line and but a few yards apart, all very symmetrical, none showing previous digging

Fig. 98.—Mounds on the Campbell Place, Tenn.

or disturbance by the plow. These mounds are shown in Fig. 98. Their heights in order going eastwardly are 9 feet, 9 feet 4 inches, 8 feet 2 inches, 11 feet 3 inches; their diameters, 45 feet each, with the exception of the highest, which is 50 feet.

A short distance from these mounds, though not in line with them, is another, 11 feet 5 inches in height and 70 feet in diameter. A trench of considerable size, which we were informed had yielded only fragments of bones, had been put in from one side.

The mound nearest the landing, the one 5 feet in height, was selected by us for examination, and an excavation 12 feet square was put down by us through the base, which proved to be at a depth of slightly more than 4 feet. At 16, 20, and 22 inches down were decaying fragments of bone. On the base-line was a fragment of the petrous part of a temporal bone of a human skull.

Mounds near Rockwood Landing, Roane County.

On the property of Dr. Charles Wilson, of Rockwood, Tenn., are five mounds ranging between 4 and 9 feet in height (estimated). Permission not granted.

Mound on the Hood Place, Roane County.

On property of Mr. T. L. Hood, in full view from the water, is a mound 11 feet in height and 55 feet in diameter (estimated), which, when visited by us

at the close of the season, was surrounded with growing grain. In view of the unproductive character of the mounds in this region, and the damage to property which the work would entail, we did not consider it worth while to investigate this mound.

Mounds on the Butler Place, Roane County.

On the property of Mrs. Fanny Butler, of Harriman, Tenn., immediately across the river from the Ewing Place, next to be described, in sight from the water, are three mounds, two about 5 feet in height, one 3.5 feet high, approximately, having respective diameters of 50, 50, and 40 feet (estimated). These mounds at the time of our visit were covered with growing grain and were not investigated by us.

Mounds on the Ewing Place, Roane County.

On the property of Mr. R. E. Ewing, resident thereon, are six mounds in a cultivated field, a few yards from one another, none of which has been plowed over. The group is visible from the river. Someone, doubtless a victim of unrequited endeavor, had dug a large trench into one of the principal mounds before our coming, but otherwise no sign of previous disturbance was apparent in the group.

These mounds are in height, respectively: 12 feet 6 inches, 10 feet 9 inches, 10 feet 2 inches, 8 feet 5 inches, 7 feet, 5 feet 7 inches; the diameters being 65 feet, 55 feet, 65 feet by 55 feet, 50 feet, 50 feet, 45 feet.

A hole 12 feet square, sunk by us centrally in the smallest mound, came upon parts of a skeleton at a depth of 16 inches, so badly decayed that even the teeth crumbled when rolled between the thumb and fingers.

A distinct base-line was reached at a depth of 6 feet 3 inches, and on this dark stratum, in a corner of the excavation, were the remains of a skull in the last stage of decay, other bones perhaps having disappeared. With the skull was an asymmetrical banner-stone of sandstone, a rounded ellipse in outline, with the perforation so clumsily made that fragments of the stone were broken out at each extremity of it. At some distance from the skull was a rude arrowhead or knife, of flint.

On one side of the center of the excavation was a roughly circular grave between 5 feet 3 inches and 5 feet 10 inches in diameter, cutting through the base-line and extending 2 feet 3 inches below it, at the deepest part. The sides of the grave, however, sloped considerably, and it was only in the central part that the greatest depth was attained.

The pit had been dug into undisturbed red clay, and some of this clay had been piled around the opening, while more of it, mixed with dark soil which had been scraped from the surface and of which the mound was made, had been used to fill the grave. Careful search failed to discover any trace of skeletal remains in this pit, and as the soil in the bottom of it was very moist it is almost certain that a burial originally in the grave had decayed away.

Mounds on the Tedder Place, Roane County.

On property belonging to Mrs. Sarah Tedder who lives upon it, are three mounds a short distance apart, two on high land and visible from the river, one on sloping ground, a short distance farther back. The two mounds first mentioned, 10 feet and 9 feet 3 inches high, respectively, and each about 50 feet in diameter, are in a cultivated field, but themselves untouched by the plow.

The third mound, reduced by cultivation, is 4.5 feet high and 50 feet in diameter of base. Into this mound, centrally, a hole 12 feet square was sunk to the base resting on undisturbed clay. Somewhat away from the middle of the excavation was a skeleton extended on the back, not in a grave, apparently, but which seemingly had been placed upon the original surface of the ground and the mound erected over it. To the left of the skull were twelve musselshells (*Unio crassidens*).

Mounds on the De Armond Place, Roane County.

On property of the De Armond estate are three mounds in a cultivated field, on a ridge overlooking the river, from which they would be visible did not trees intervene. The mounds are 8 feet 3 inches, 4 feet 8 inches, and 3 feet 6 inches in height, and 50 feet, 45 feet, and 45 feet in diameter, respectively. The two smaller mounds have been under cultivation and have been much spread; the largest mound had trees upon it and seemingly was untouched by the plow.

In the central part of the smallest mound a hole 12 feet square was put down which came upon small deposits of musselshells, here and there, unconnected with burials. The mound proved to be of dark soil which seemingly had been gathered from a dwelling-site, though the surface of the surrounding area, at the present time, shows no sign of admixture with organic matter. Probably the soil of the midden site, long since loosened by the plow, has been washed away by rain.

Off toward one side of the excavation was a grave, extending 2 feet below the base of the mound, which was 3 feet 5 inches below its highest part. This grave-pit was distinctly marked, the dark soil of the mound extending into the red clay and gravel of the hills.

On the bottom of the grave was a skeleton extended on the back, much decayed. A small amount of charcoal lay beside it.

Mounds on the Evans Place, Roane County.

The Evans Place, on which is the terminus of a branch railroad which there transfers iron ore to a steamer, is under the management of Mr. J. W. Bowman. A short quarter of a mile in from the landing at this place are three mounds, two of which, 9 feet and 6 feet in height, respectively, and each 45 feet in diameter, have never been under cultivation and are filled with roots of trees, some of great size.

The third mound, which we selected for investigation, was 4 feet in height and 50 feet in diameter. It had been under cultivation for a long time. A hole 12 feet square came upon traces of a skull, 6 inches down, and reached the base-line of the mound at a depth of 3 feet.

Off toward one side of the hole were two burials which apparently had been laid on the original surface of the ground and the mound then had been built over them. These burials, which had been placed face to face in flexed positions, were traceable only through the presence of badly decayed bones of the legs and thighs in both instances, of the pelvis in one case, and of both skulls. No other bones were in evidence, and presumably they had decayed away. Near these mounds were remnants of several others almost plowed to the level of the field.

Mounds near Hood's Ferry, Roane County.

On property of Mr. R. H. Alford, who lives on it, are four mounds and several remnants of mounds, in sight from Hood's Ferry and from one another. These mounds, which have all been under cultivation, are: 10 feet high, 55 feet in diameter; 4 feet in height, 65 feet in diameter; 12.5 feet high and 50 by 75 feet in diameter; 6 feet 8 inches in height and 65 feet in diameter.

The mound last mentioned was selected by us for investigation, with the feeling on our part that it was as likely as any of the others to demonstrate how little of an imperishable nature was put with the dead by the aborigines of this region. The usual excavation, 12 feet square, was put down centrally in the mound and showed it to be composed of the brown clay mixed with sand, of the bottom-land on which it was, and proved also that the height taken from the outside, namely 6 feet 8 inches, was misleading, as the sloping ground on which the mound was reared had been exposed to wash which had hollowed out the ground immediately around it. A dark line marking the base was reached at a depth of 4 feet 8 inches. This line, however, was not apparent at one corner of the excavation, though careful digging failed to discover a pit.

Lying on the base of the mound to one side of the center of the excavation, was a small deposit of calcined fragments of human bone. Above them the ground was soft to a height of about one foot, but no pit could be determined, as the material covering the bones was of the same color as that of the rest of the mound.

About three-quarters of a mile back from the river, also on Mr. Alford's property, are four other mounds near together, which were visited by our agent. We were informed that these mounds were about the same size as those already described on this place.

Mounds on the Goodwin Place, Roane County.

On property belonging to Mr. R. E. Ewing are three mounds, 9 feet, 6 feet, and 5 feet in height; and 50 feet, 40 feet, and 35 feet in diameter, respectively. Owing to a misunderstanding as to the nature of our expedition, permission to

explore these mounds was not granted by Mr. Ewing, who was consulted by telephone. Later, when we called on Mr. Ewing, another place owned by him was cordially put at our disposal.

Mounds on the Biss Place, Roane County.

On the property of Mr. Henry D. Biss, who resides on it, are three mounds. Two of these, about 60 yards apart, on high ground, are visible from the river, the larger, which has an extensive hole in the center, left by a previous digger, being 11.5 feet in height and 60 feet in diameter, and having, like nearly all the mounds of this region, an almost circular base.

The smaller mound, between 3 and 4 feet in height, and 45 feet in diameter, is on a slope.

An excavation 12 feet square was put down in the smaller mound, reaching undisturbed clay at a depth of 3 feet 7 inches. Just beneath the surface were remains of a skull and fragments of other bones. An arrowhead of flint was found isolated in the clay.

At a depth of 2 feet 5 inches was the skeleton of an adolescent, partly flexed to the left, without the skull. While the bones of this skeleton were badly decayed and friable, they were distinct, so that it was clear that the skull was not missing through decay. No sign of disturbance, aboriginal or recent, was noticeable near the skeleton, which apparently had been interred without the cranium.

At the right shoulder was a small, triangular arrowhead of flint, and four of the same material and shape were at the left shoulder, a particularly graceful one being 1.7 inch in length and .65 inch across the base. On the pelvis was part of the columella of a conch-shell, much decayed.

A most careful search failed to reveal any sign of a burial below the base of the mound.

We obtained from Mr. Biss, who informed us he had plowed it from this mound, an object of coarse-grained diabase, 6.6 inches in length, 3 inches in maximum width, 1.1 inch wide at the narrow end, 2.75 inches at the opposite end, and .3 inch in maximum thickness (Plate VII, Fig. 2). In shape this object much resembles a ceremonial axe, which we believe it to be and that it was carried attached to a handle, as the perforation is placed in a position in the blade similar to that found in numerous unquestioned ceremonial axes. The absence of a cutting edge in the specimen under consideration does not, in our opinion, seem incongruous in the case of an axe intended only for ceremonial use.

An object of like material, and otherwise similar, save that it is somewhat smaller, is in the Vaux collection at the Academy of Natural Sciences of Philadelphia and is reported to have come from West Virginia.

In a description of the Mason collection in the American Museum of Natural History, New York, is figured[1] another of these ceremonial axes (according to

[1] Alanson Skinner in "The American Museum Journal," April, 1914.

our belief) which the author classes among pendants. This axe or pendant, as the case may be, resembles ours (again even as to material), but in addition has certain notches at one end. Its size is not given. The Mason collection is said to be composed of objects from the vicinity of Jonesboro, Tenn., which is in the northeastern corner of that state.

In an interesting paper[1] Dr. A. C. Simoens da Silva figures one of these ceremonial objects which he describes as "a stone axe without a cutting edge" and calls it "the insignia of an Indian chief." This axe, he tells us, is a fine-grained diabase and was found in southern Brazil. He believes it was worn suspended from the neck.

On the Biss Place also is a remnant of a mound which had been considerably dug into previous to our coming and was not examined by us.

Mounds on Long Island, Roane County.

On Long Island, which is about 3 miles in length and is owned by Messrs. Gorda Johnson Sons, of Lookout Mountain, Tenn., is a mound about 18 feet in height, and a considerable number of small mounds, none, we believe, having an altitude of more than 7 feet. Permission was refused.

The large site on Long Island was in part investigated on behalf of the Bureau of American Ethnology,[2] resulting in the discovery of an interesting stone image which is figured in the report. Long Island, as we have explained, is in a part of Tennessee river formerly called Holston river, and it is so spoken of in the account.

The statement made (page 359) that the large mound on Long Island was known as the Brakebill Mound and was explored by the Rev. E. O. Dunning on behalf of Peabody Museum of Cambridge, Mass., is an error. The Brakebill Mound[3] is near the junction of the Holston and French Broad rivers, just above Knoxville, Tenn.

Mounds near Huffine Ferry, Roane County.

About 400 yards in a southerly direction from Huffine Ferry and in full view from the river is a mound on cultivated land belonging to Mr. B. F. Huffine who resides nearby. The mound, which has been plowed over for a long time, is on a slope, and presumably the ground around it has been washed away, as its height, 4.5 feet as measured from the outside, proved to be considerably less when our excavation, 12 feet square, was carried centrally to the base. The diameter of the mound was 40 feet.

Near the surface was part of the shaft of a human femur. At a depth of

[1] "Points of Contact of the Prehistoric Civilization of Brazil and Argentina with those of the Pacific Coast Countries." Proceedings of the International Congress of Americanists, XVIII Session, Part II. London, 1912.

[2] Twelfth An. Rep., p. 358 *et seq.*

[3] Fifth An. Rep. Peabody Museum, p. 11.

26 inches a dark line was reached, presumably the original surface of the ground, beneath which was the undisturbed red clay of the hills.

In the eastern side of the excavation was a grave in the form of an irregular circle with diameters of 5 feet 10 inches and 6 feet 6 inches. This pit apparently had been dug to a depth of 2 feet below the base of the mound and was clearly defined, extending into the red clay.

On the bottom of the grave was a skeleton partly flexed on the left side, with charcoal under it and along it in places. The grave, which was concave, resembling a large basin, had been partly filled with the red clay that had been dug out in its making and which also was piled around the margin of the grave. The red clay that had been used to fill was easily distinguishable from the clay of the same color of the solid ground surrounding it, as it was much less compact than was the undisturbed clay. Evidently the mound had been built largely from the brown material taken from the surface, and this material had been used to complete the filling of the grave.

About one-half mile SSE. from the mound just described, also on the property of Mr. Huffine, is another, somewhat smaller, which we decided not to investigate.

Mound on the Pickles Place, Roane County.

On the property of Mr. J. E. Pickles is a mound 40 feet in diameter and 5 feet high (estimated). Permission not granted.

Mounds near Paint Rock Creek, Roane County.

One-half mile S. by E. from the mouth of Paint Rock creek, in a cultivated field belonging to Mrs. J. H. Byrd, of Loudon, Tenn., is a mound about 9 feet high and 75 feet in diameter (estimated). This mound, though kindly placed at our disposal by Mrs. Byrd, was covered with growing grain at the time of our visit and was not dug into by us.

On the property of Mr. R. H. Bell, on the lower side of Paint Rock creek, are seven mounds: one 3.5 feet, three 5 feet each, one 10 feet, one 12 feet, one 22 feet in height (estimated). The two largest mounds have flat tops; on the smallest is a building. Permission refused.

In the Third Annual Report of the Bureau of American Ethnology (page 461) is an account of these mounds near Paint Rock Ferry, which is near the mouth of Paint Rock creek. The height of the largest mound is given as 40 feet, a great over-estimate. In a mound at this place, according to the investigator for the Bureau, a stone grave (not of the box-shape) was found and stone slabs lay on the surface.

Mounds near Mouth of Pond Creek, Loudon County.

About one-quarter mile W. by S. from the mouth of Pond creek, and in sight from it, is a mound in a cultivated field, the mound also having been plowed over. Mr. F. A. Berry, the owner of the property, who resides on it, informed

us that while the field had long been under cultivation, the mound had only recently been cleared of trees and, so far as he knew, it had not been dug into to any extent. This absence of wear and wash doubtless explains the symmetry of the mound, which, though 10.5 feet in height, was only about 60 feet in diameter, its shape being the usual blunt cone found in this region.

A few feet from this mound is what the plow has left of another one, the height of this remnant being about 2 feet, the diameter about 45 feet. As this remainder had been dug into considerably before our visit, it was not investigated by us.

On that part of the field which surrounds these mounds, considerable midden-debris, seemingly free from any objects of interest, is scattered.

In the larger mound a hole 12 feet square was put down to and through the base, which, in the shape of a dark, irregular streak about one inch in thickness, was encountered at a depth of 12 feet.

Throughout the digging human remains were ten times encountered at depths beween 16 inches and 10 feet 7 inches, the upper burials being in a far poorer condition through decay than were the lower ones, presumably because the upper part of the mound (which was of clay from the bottom-land on which the mound stood) was damp, while the ultimate three or four feet were perfectly dry at the time of our visit. While it is likely that in the rainy season the whole mound may be affected by moisture, the lower part is dry for a much longer period each year than is the upper portion.

The burials in order of depth were as follows: a bunched burial with bones belonging to at least four persons, having in association a canine tooth of a large carnivore, too much decayed to determine if it had been perforated or grooved for suspension, and parts of two columellæ of conch-shells; a skull having the lower jaw much decayed; traces of a tibia and a femur; remains of a skull; remnants of bones of two legs flexed; fragments of a skull; a skeleton partly flexed on the left side; one partly flexed on the right side; one closely flexed on the right side, having with it a small quantity of ashes and charcoal; a skeleton at full length on the back, having near the skull a small, triangular arrowhead of flint, with the line of the base concave.

No grave-pits were apparent in the body of the mound.

In one corner of the excavation was a pit, roughly circular, about 33 inches in diameter, tapering considerably toward its base, which was 14 feet from the summit of the mound. This pit, which clearly cut through the dark line of the base of the mound and two feet beyond, was not determinable as to where it commenced in the mound. Probably it had been started from the original surface of the ground, and after it had been filled the mound was built over it.

In the bottom of the pit and around the sides of the lower part were masses of very hard clay, or possibly claystone which had deteriorated since the time of its burial. Enclosed by these masses was granular soil easily removed with a trowel, while to loosen the clay in that part of the mound which surrounded the pit the use of a pick was necessary. This granular earth extended about 10

inches above the base-line of the mound, and probably was what was left when the pit was filled. Over this little mound, to the height of about a foot, was dark clay resembling that found on the surrounding field. This clay probably had been gathered from the level ground and piled above the small mound as a nucleus for the greater one. Above this dark clay was a deposit of thirty or forty musselshells, much decayed.

Although great care was exercised in the removal of the contents of the pit, no trace of human remains was discovered. If the pit had served as a place of burial, the remains that had been interred in it had decayed away. Presumably the pit below the base of the mound, into which water probably could percolate from the general level of the field, would contain more moisture than would lower parts of the mound above it.

Mound near Cave Creek, Roane County.

A mound about one-quarter mile due N. from the mouth of Cave creek, in a cultivated field, on property of Mr. Robert Dowdy, 4 feet in height and 40 feet in diameter (estimated). Permission not granted.

Mound on the E. E. Blair Place, Loudon County.

About one-half mile in from the river, on the property of Mr. E. E. Blair, living in the vicinity, in a cultivated field, is part of a mound now nearly plowed away. We did not consider this remnant worthy of investigation.

Mound on the W. W. Blair Place, Loudon County.

On the property of Mr. W. W. Blair, who lives upon it, about one mile below the town of Loudon but on the opposite side of the river, is a mound one-half mile from the landing in a cultivated field and in view from the road. The mound 4 feet in height and 45 feet in diameter of base, which we were told had been plowed over for years, showed no evidence of previous digging, though the presence of musselshells upon it, while none are on the surrounding field, indicated that digging had been done or that parts of the mound had been plowed away.

Later an excavation 12 feet square showed that a trench about 4 feet wide had been dug in from the western side of the mound, and, extending below its base, had reached its central part. Evidently this trench had been filled in during the cultivation of the mound.

Human remains, all very badly decayed, were encountered as follows: fragments of bones disturbed by the plow; a skull 10 inches down; remains of a skeleton at a depth of 14 inches, which apparently had been partly flexed to the left; remains of bones indicating a burial partly flexed to the right, 28 inches deep; remnants of the skeleton of a child, 3 feet 8 inches below the surface; fragments of bone in the former digging and other fragments in the mound near the trench, 3 feet 10 inches deep.

The mound was composed of the red earth of the hills to a depth of 3 feet 3 inches, below which, for somewhat more than one foot, was what seemed to be brown soil gathered from the adjacent surface. Below this was undisturbed red clay.

On this undisturbed clay, 4 feet 5 inches down, was a skull which may have been interred alone, or, as it lay near the trench, it may have been all that had not been cut away by the previous digging.

Throughout our investigation of this mound the only artifact found was a small, flint arrowhead.

Mound opposite Loudon, Loudon County.

On property of Mr. Walter Blair, opposite the town of Loudon, at the foot of the hills, about one-quarter mile in from the river, is a mound 5 feet in height and 40 feet in diameter (estimated), a large part of which has been dug out. Permission to investigate this was not urged by us.

Mound on the Carmichael Place, Loudon County.

On a low hill about one-quarter mile in from the river, and in sight from it, is a mound slightly more than 3 feet in height and 36 feet in diameter, on property belonging to Mr. N. B. Carmichael, who resides upon it.

The mound was composed largely of the red clay of the hills, which is reached a few inches below the general surface, but the upper clay having lost part of its iron through the growth of vegetation, had assumed a brown or yellow appearance. This superficial layer made it easy to determine when the base of the mound, the original surface of the ground, had been reached, and the red clay beneath it made the determination of intruding yellow or brown clay in pits also an easy matter.

An excavation 12 feet square came upon, at a depth of 14 inches, a skull face down, and some small decaying fragments of bone, among which were recognized part of a humerus and small remnants of a forearm.

The base of the mound was reached at a depth of 2 feet 4 inches. Somewhat off from the center of the base was a pit, 4 feet 10 inches by 4 feet 2 inches, extending 1 foot 2 inches below the original surface, or base of the mound. On the bottom of the pit a skeleton, hardly more than traceable, lay partly flexed to the left, the head W. by S. The pit evidently had been filled prior to the building of the mound, as the mixed material in it differed from the composition of the mound in the neighborhood of the grave. In addition, the material filling the grave had been made into a little mound 10 inches in height above the grave, over which the mound proper had been built.

Another pit, 4 feet 11 inches by 2 feet 8 inches, also was somewhat away from the center of the base. Its depth below the original surface of the ground was 10 inches. In it lay faint traces of a skeleton partly flexed to the right, the head SSE.

Mounds on the Arthur Place, Loudon County.

On cultivated ground belonging to Mr. Felix Arthur, whose home is near by, are four mounds, all in sight from the bank of the river, the largest 5 feet 8 inches in height and 55 feet in diameter. Three of these mounds are in line and but a few feet apart. The fourth, about 200 feet away, is at a right angle from the middle mound of the three. Trees of considerable size on all the mounds give evidence that they have not been under cultivation in recent years; indeed, judging from their appearance, they have never been plowed.

The mound chosen for investigation (the one at a distance from the rest) was 5 feet 6 inches in height and 40 feet in diameter. A hole 12 feet square, dug into the central part, reached a decaying skull and some small fragments of bone, about 22 inches down.

In another part of the excavation, at a depth of 16 inches, were traces of bone and teeth of a child, with which were a few shell beads, and some marine shells (*Olivella mutica*) pierced for use as beads.

Twenty-six inches down were a skull and some traces of other bones indicating a flexed burial. A small, flat fragment of limestone lay on the lower part of the trunk.

Apart from bones were: a graceful arrowhead of flint, triangular, with the two basal extremities projecting downward somewhat; two spherical pebbles and one somewhat resembling a diminutive brick in shape, together.

When the excavation had reached a depth of about 5 feet, heavy and prolonged rain induced us to abandon work additional to the filling of the excavation.

Mound near Lenoir City, Loudon County.

About one-half mile northwest from Lenoir City Landing is a mound about 5 feet high and 40 feet in diameter (estimated), on property of the Lenoir City Company. Permission not granted.

Mounds opposite Lenoir City, Loudon County.

About one mile east of the ferry landing opposite Lenoir City, where Little Tennessee river enters the Tennessee, on the farm of Mr. J. W. Bussell, are five mounds, the largest about 6 feet high and 50 feet in diameter (estimated). Permission refused.

The mounds on both sides of Tennessee river, near Lenoir City, are described and mapped in the Twelfth Annual Report of the Bureau of American Ethnology (page 397 *et seq.*).

Mounds on the Edward Prater Place, Blount County.

In a cultivated field, on high land rising from the river-bank, belonging to Mr. Edward Prater, who lives somewhat farther back in the country, are two mounds but a few feet apart, one of which, about 18 inches in height, seemed to have been thoroughly dug.

The other, though it had been under cultivation, showed no sign of digging. Its height was about 2 feet; its diameter, about 45 feet. Four large trial-holes in the central part of the mound showed the base to be about 2 feet 9 inches down, and in one instance came upon a skeleton flexed to the right, at a depth of 20 inches.

At the left of the skull was a small, complete, quartz crystal. Though bearing no perforation or groove for suspension, this crystal, perhaps, had been an ornament, or possibly a part of the paraphernalia of a medicine-man. Small wonder that quartz crystals, with their striking and mysterious appearance, should appeal to the savage mind as efficacious in the practice of "medicine" or magic. Fragments of quartz crystals are found in the bags carried by sorcerers in Roro, New Guinea.[1] The medicine-men of the Papago Indians[2] of Arizona use crystals to induce rain, and they form part of the equipment of the priests of the Pueblo Indians of New Mexico and Arizona today as of old. We found many large quartz crystals in the mound at the Haley Place,[3] southwestern Arkansas, interred evidently with important persons. All recall the bit of quartz crystal in the Natchez temple, and doubtless many other examples of the use of crystals by aborigines are familiar to most of us.

In the field near the mound is a small dwelling-site having a few shells and other debris scattered upon it. Apparently much of it had been washed away. No burials were encountered.

Dwelling-sites on the S. E. Prater Place, Blount County.

Adjoining the Edward Prater Place is the property of Mr. S. E. Prater, living some distance back toward the hills. Two dwelling-sites on this place were covered with growing grain, and as the region was so unpromising no effort was made on our part to arrange terms for an investigation.

Dwelling-site on Grant Island, Blount County.

On Grant Island is a dwelling-site, to investigate which we were unable to obtain permission. Owner, Mr. John Queener.

Dwelling-site on Cox Island, Knox County.

Cox Island, whose area is restricted, belongs to Mr. W. L. Hinson, living nearby on the mainland. On part of this island is an aboriginal dwelling-site covered with pebbles, broken and whole, some of fair size; hammer-stones; some shells; a small number of bits of pottery, and here and there fragments of human bones. The pebbles at this place are silicious, but flint is practically absent.

From the surface were gathered an arrowhead of flint, a rude grooved axe of sandstone, a spade of like material, and part of a slate gorget.

[1] Robert W. Williamson, M. Sc., F.R.A.I., "The Ways of the South Sea Savage," p. 160.

[2] Dr. Carl Lumholtz, "New Trails in Mexico," p. 49.

[3] C. B. Moore, "Some Aboriginal Sites on Red River," Journ. Acad. Nat. Sci. Phila., Vol. XIV, p. 527 *et seq.*

Considerable digging resulted in the discovery of the skeleton of a child at a depth of one foot, and showed that most of the midden material formerly on the site had been washed away.

Dwelling-site on Prater Island, Knox County.

Prater Island, belonging to Mrs. Frank Maxey, of Maryville, Tenn., has a well-defined dwelling-site near its lower extremity, on which were fragments of shells, some scattered pebbles, and bits of human bone. From the surface were collected a handsome barrel-shaped bead of shell, nearly one inch in length; part of a slate gorget; three flint arrowheads; a small discoidal stone.

Numerous trial-holes came upon a skeleton closely flexed, face down, 10 inches from the surface, another partly flexed on the left. A grooved axe[1] of fine-grained gneiss, about 8 inches long, was unearthed one foot below the surface, apart from any burial.

Also in this site was a refuse pit, 4 feet 2 inches by 3 feet 10 inches at the top, which was 7 inches below the present surface of the field. The pit tapered inward somewhat in the upper part, and then continued down with the sides more nearly perpendicular. The depth of the pit from the surface was 5 feet, its original depth probably having been 7 inches less.

This pit, which had no burial in connection with it, was filled with refuse material, including some river shells from which the following were sufficiently preserved to identify: *Unio crassidens, Dromus dromus, Quadrula pyramidata, Q. ebena.* There was also much soil, almost black with admixture of organic matter, in the lower part, with a few shells, most of the shells with some of the dark earth being in the upper part.

Mound and Site on the Jackson Place, Blount County.

On the lower part of the property of Mr. A. N. Jackson, who resides on it, is a small, aboriginal site not far from the river, in which we were unable to find bones or artifacts. From the surface were gathered one flint arrowhead and a graceful celt of ferruginous shale, having, however, no cutting edge.

Near the landing on the same place, which is about one mile farther up the river, is a mound in a cultivated field, which would be visible from the landing were it of greater height. Careful digging into this small elevation, which was but one foot above the surface, with a diameter of 35 feet, yielded only scattered fragments of human bones.

Dwelling-site near Little River Shoals, Knox County.

At the upper end of Little River Shoals is the property of Mr. R. A. Sharp, who resides upon it. In sight from the landing at this place, in a pasture, is an

[1] Strange as it may seem, considering the amount of digging we have done, this grooved axe, the one from Cox Island, just below, and one from the site near Milton Bluff, Lawrence Co. Ala., are the first we have found beneath or on the surface in the course of our archæological investigations.

aboriginal dwelling-site whose dark soil, filled with organic matter, shows it to have been a place of aboriginal abode for a long time. On the surface were scattered shells and numerous fragments of human bones. The place has a history of many skeletons plowed up there.

From the surface were gathered: a small discoidal stone; a flat pebble rounded by chipping; a number of arrowheads and knives of flint, and one of quartz; a slate gorget, elliptical in outline, the two "perforations" of which had not been completed. Owing to a natural desire on the part of the owner that his rich pasture land should not be extensively dug into, it was arranged that four trial-holes should be put down to serve as an indication of the contents of the site.

In two of these holes were fragments of human bones, too deep for the plow to have disturbed and presumably scattered in aboriginal times. In another hole, about 20 inches deep, lay a skeleton flexed to the left, the arms folded across the lower part of the trunk. On both forearms were many small, discoidal shell beads of great uniformity of size, each being about .12 of an inch in diameter. So minute are these beads that, beyond doubt, a number were lost in the soil; 2,997, however, were recovered, including twelve somewhat broken.

Mound opposite Looney Island, Knox County.

Opposite the lower end of Looney Island is a property belonging to Dr. B. D. Brabson, of Knoxville, Tenn. In sight from the landing on this property is a mound somewhat less than 7 feet in height, and 60 feet in diameter of base. This mound had been dug out centrally and extensively trenched from two sides, and perhaps otherwise explored. In view of all this digging an investigation of the mound was deemed inexpedient.

Mound near Knoxville.

About one mile below the city of Knoxville, on the grounds of the College of Agriculture and Experiment Station, University of Tennessee, is a mound 10 feet in height and 75 feet in diameter (estimated). As there was a laudable desire on the part of the management of the college to protect the trees growing on this mound, permission to dig into it was not granted.

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WRITINGS ON ARCHÆOLOGY.

By Clarence B. Moore.

Certain Shell Heaps of the St. Johns River, Florida, hitherto unexplored. The American Naturalist, Nov., 1892, to Jany., 1894, inclusive. Five papers with illustrations in text, and maps.

Certain Sand Mounds of the St. Johns River, Florida, Parts I and II. Journal of the Academy of Natural Sciences of Philadelphia, Philadelphia. 1894. Vol. X. Quarto, 130 and 123 pages. Frontispieces, maps, plates, illustrations in the text.

Certain Sand Mounds of Duval County, Florida; Two Mounds on Murphy Island, Florida; Certain Sand Mounds of the Ocklawaha River, Florida. Journ. Acad. Nat. Sci. of Phila., 1895. Vol. X. Quarto, 108 pages. Frontispiece, maps, plates, illustrations in text.

Additional Mounds of Duval and of Clay Counties, Florida; Mound Investigation on the East Coast of Florida; Certain Florida Coast Mounds north of the St. Johns River. Privately printed, Philadelphia. 1896. Quarto, 30 pages. Map, plates, illustrations in text.

Certain Aboriginal Mounds of the Georgia Coast. Journ. Acad. Nat. Sci. of Phila., 1897. Vol. XI. Quarto, 144 pages. Frontispiece, map, plates, illustrations in text.

Certain Aboriginal Mounds of the Coast of South Carolina; Certain Aboriginal Mounds of the Savannah River; Certain Aboriginal Mounds of the Altamaha River; Recent Acquisitions; A Cache of Pendent Ornaments. Journ. Acad. Nat. Sci. of Phila., 1898. Vol. XI. Quarto, 48 pages. Frontispiece, maps, illustrations in text.

Certain Aboriginal Remains of the Alabama River. Journ. Acad. Nat. Sci. of Phila., 1899. Vol. XI. Quarto, 62 pages. Map, illustrations in text.

Certain Antiquities of the Florida West-Coast. Journ. Acad. Nat. Sci. of Phila., 1900. Vol. XI. Quarto, 46 pages. Maps, illustrations in text.

Certain Aboriginal Remains of the Northwest Florida Coast, Part I; Certain Aboriginal Remains of the Tombigbee River. Journ. Acad. Nat. Sci. of Phila., 1901. Vol. XI. Quarto, 100 pages. Maps, illustrations in text.

Certain Aboriginal Remains of the Northwest Florida Coast, Part II. Journ. Acad. Nat. Sci. of Phila., 1902. Vol. XII. Quarto, 235 pages. Maps, illustrations in text.

Certain Aboriginal Mounds of the Central Florida West-Coast; Certain Aboriginal Mounds of the Apalachicola River. Journ. Acad. Nat. Sci. of Phila., 1903. Vol. XII. Quarto, 136 pages. Maps, illustrations in text.

Sheet-copper from the Mounds is not Necessarily of European Origin. American Anthropologist, Jan.-March, 1903. Plates in text.

The So-called "Hoe-shaped Implement." American Anthropologist, July-Sept., 1903. Illustrations in text.

Aboriginal Urn-burial in the United States. American Anthropologist, Oct.-Dec., 1904. Plate.

A Form of Urn-burial on Mobile Bay. American Anthropologist, Jan.-March, 1905.

Certain Aboriginal Remains of the Black Warrior River [Moundville]; Certain Aboriginal Remains of the Lower Tombigbee River; Certain Aboriginal Remains of Mobile Bay and Mississippi Sound; Miscellaneous Investigation in Florida. Journ. Acad. Nat. Sci. of Phila., 1905. Vol. XIII. Quarto, 206 pages. Maps, illustrations in text.

Moundville Revisited; Crystal River Revisited; Mounds of the Lower Chattahoochee and Lower Flint Rivers; Notes on the Ten Thousand Islands, Florida. Journ. Acad. Nat. Sci. of Phila., 1907. Vol. XIII. Quarto, 144 pages. Maps, illustrations in text.

Certain Mounds of Arkansas and of Mississippi (including Doctor Hrdlička's paper on the Crania). Journ. Acad. Nat. Sci. of Phila., 1908. Vol. XIII. Quarto, 130 pages. Maps, illustrations in text, eight colored plates.

Antiquities of the Ouachita Valley. Journ. Acad. Nat. Sci. of Phila., 1909. Vol. XIV. Quarto, 170 pages. Maps, illustrations in text, eight colored plates. (In addition in this number is Doctor Hrdlička's paper on the skeletal remains.)

Antiquities of the St. Francis, White, and Black Rivers. Journ. Acad. Nat. Sci. of Phila., 1910. Vol. XIV. Quarto, 112 pages. Maps, illustrations in text, twenty colored plates.

Some Aboriginal Sites on Mississippi River. Journ. Acad. Nat. Sci. of Phila., 1911. Vol. XIV. Quarto, 116 pages. Map, illustrations in text, eight colored plates.

Some Aboriginal Sites on Red River. Journ. Acad. Nat. Sci. of Phila., 1912. Vol. XIV. Quarto, 163 pages. Map, plans, illustrations in text, eight colored plates.

Some Aboriginal Sites in Louisiana and in Arkansas. (Atchafalaya River, Lake Larto, Tensas River, Bayou Maçon, Bayou D'Arbonne, in Louisiana; Saline River, in Arkansas.) Journ. Acad. Nat. Sci. of Phila., 1913. Vol. XVI. Quarto, 102 pages. Maps, plans, illustrations in text, two colored plates.

Aboriginal Sites on Tennessee River. Journ. Acad. Nat. Sci. of Phila., 1915. Vol. XVI. Quarto, 258 pages. Maps, plans, illustrations in text, four colored plates.

Some Aboriginal Sites on Green River, Kentucky

Certain Aboriginal Sites on Lower Ohio River

Additional Investigation on Mississippi River

BY

CLARENCE B. MOORE

PHILADELPHIA
1916

SOME ABORIGINAL SITES ON GREEN RIVER, KENTUCKY. CERTAIN ABORIGINAL SITES ON LOWER OHIO RIVER. ADDITIONAL INVESTIGATION ON MISSISSIPPI RIVER.

By Clarence B. Moore.

INTRODUCTION.

Green river, having its source in central Kentucky, runs westwardly to its junction with Barren river,[1] after which its general course is westward and northward until its union with Ohio river, a few miles above the city of Evansville, Indiana, which is, as we know, across the Ohio.

Green river, which, with the aid of a series of dams and locks, is navigable as far up as Mammoth Cave, 196 miles following the course of the stream, was to that place searched carefully in advance of our visit, by J. S. Raybon, captain of our steamer, and a companion, and was gone over by our expedition ascending to Mammoth Cave and descending. The time devoted by us to this work, addresses of owners of properties and permission to dig having been obtained in advance, was nine weeks of the fall and winter of 1915–1916, the remainder of nearly five months being devoted to rather profitless work on Ohio and Mississippi rivers.

There has been no systematic search along Green river preceding our own, though some digging has been done, probably through local endeavor.

The river was dammed and locked about 1830, and the land bordering that part visited by us is cultivated throughout, so that such mounds and other sites as there are on the river have been known for a long time. The mounds are small and sometimes are used as sites for pens for stock; some are composed of masses of rock and of clay—usually an unproductive kind from an archæological point of view—and a few are of raw clay and seemingly were not made for burial purposes.

Aboriginal dwelling-sites along the river are few and as a rule are small.

A number of the mounds have been dug into, while the smaller ones, as well as numerous dwelling-sites, and some stone graves of which we heard, have been destroyed by cultivation.

An interesting feature of our work this season was the knowledge gained by us that a class of so-called banner stones, oblong in form or of kindred shapes,

[1] Barren river, navigable to the city of Bowling Green, about thirty miles by water, was searched as far as that town by our agents, who failed to discover any site of interest upon it.

and also probably some of the winged stones, were not ceremonial or ornamental but had a definite practical use. Exactly what this use was, however, unfortunately we are unable positively to determine.

Along part of Green river, Ky., and particularly in "The Indian Knoll," Ohio County, were found by us objects of antler, hooked at one end and having a cavity in the other end, in which sometimes was asphalt,[1] used for fastening something introduced into the cavity. These objects, all that were found by us except eight[2] too fragmentary for restoration, are shown in Figs. 4, 10, 12, 13.

Usually in intimate association with these hooked implements of antler were found, in nearly every instance where the hooked implements were present, as exactly described later in this report, other objects, some of antler (most of which were made from the base of the horn), some of stone.

These objects of stone and of antler evidently were employed for the same purpose, sometimes those of stone being with the hooked implements, as were sometimes those of antler. Each has a longitudinal perforation of considerable diameter. The objects of stone, which would be called banner stones and regarded as belonging to the ornamental or ceremonial class were their association at this place unknown, are oblong in outline or of some similar form, a few being of the winged variety. They are carved with the utmost care,[3] as a rule almost flat on one side, somewhat convex on the other, and having on the convex side a slight ridge extending longitudinally along the median line. The material for their making was evidently carefully selected, some being of stone rich in coloring, including quartz, flint, chalcedony, and a silicious material closely resembling jade.[4] A few of the objects of antler have the rough, original surface and perhaps were unfinished.

[1] Dr. H. F. Keller writes: "The material 'from cavity in needle from Burial 84,' Indian Knoll, is asphaltum mixed with a large proportion of mineral matter. It melts readily, burns with a bright flame, and the pitch is readily extracted with solvents like chloroform, carbon bisulphide and turpentine. The ash amounts to about 70 per cent., and consists of a ferruginous clay, and a considerable proportion of phosphate of lime." Asphalt is at present found in quantity near Green river, not far from "The Indian Knoll," where it is taken out for commercial purposes. The aborigines probably used it as they found it, without attempt at refining.

[2] Belonging to Burials Nos. 34, 84, 87, 105, 115, 211, 219, 251, all from "The Indian Knoll."

[3] The following quotation is of great interest, showing as it does the high esteem in which sizers used in net-making, which it is likely these objects were, were held among Papuans and perhaps explains the importance attached to them at "The Indian Knoll."

"Besides the netting cord . . . the only tool used is the mesh-block. This is a thin block of hard wood rasped into shape, and, since these tools are treasured as heirlooms, together with interminably long rhythmical recitals of the wonderful takes of fish made by nets fabricated on each block, the wood most commonly employed is the very dense and hard iron-wood (*Casuarina equisetifolia*). It is highly polished and usually ornamented upon the ends with property marks, showing the exogamous marriage class and *gens* of the owner, which here take the place occupied by tribal distinctions among the endogamous races." William Churchill, "Reef Knot Nets," *Popular Science Monthly*, vol. XL, p. 84.

[4] Of course no slides for microscopical examination have been cut from these sizers, but tests as to specific gravity and hardness have been made. Mr. F. J. Keeley writes: "As far as I was able to judge from physical appearance and hardness of the objects, I felt confident they were jade, but

These objects of antler and of stone, which, as we have said, evidently were used for the same purpose, the hooks being with one or with the other class indiscriminately, are shown in Figs. 3, 4, 9, and Plates IX, X, XI, which include illustrations of all of both classes found by us, some of the objects of stone, found broken ceremonially, having been restored.

Judging that some use in common could be found for the hooked implements and the objects of antler and of stone, it seemed to us at first that the correct solution of the problem might be that respectively they were netting needles and objects used with them for spacing the meshes of the nets, variously called sizers, spacers, mesh-measurers, mesh-gauges, mesh-boards, mesh-blocks.

Hereafter in this report, for convenience and not because we are fully convinced they are such, we shall designate the hooked implements as needles and the objects found with them as sizers.

We were aware that we had to face two probable objections in connection with our determination, namely, the orifices in the ends of the needles, and the perforations in the sizers, neither of which seem absolutely necessary for the use to which the needles and sizers were assigned.

The hollow part in the needles we considered to be a receptacle for some adjunct, perhaps purely decorative; and the perforation in the sizers to have been made for the reception of a handle, knowing that the Eskimo of Alaska have handles on their sizers, which, however, are of bone and all of one piece. Moreover, we have found by experiment that a handle affixed to one of our sizers is of assistance in net-making with it, and, in addition, would afford a means for suspension much preferable to running a cord through the perforation and bringing it up along a side, since this would interfere with the work for which the sizer was intended.

A section of net made by J. S. Raybon, captain of our steamer, with wooden models of a needle and sizer found by us, is shown in Fig. 1. In this net (where the knot is a half-hitch as used by civilized peoples in net-making and, according to Mason, by some modern Indians) the hooked needle, not used as a bobbin with the cord wound around an end of it, was a decided advantage in catching the cord and pulling it through the knot. By this process, of course, the entire length of cord employed must be drawn through each mesh, a comparatively slow but not prohibitive performance for a people who girdled a tree with fire, pounded out the charcoal, and kept on repeating this operation until the tree was felled. Besides we are not sure that cord of considerable length was possessed by the aborigines in the far-off days of "The Indian Knoll."

If, on the other hand, a hooked implement were to be used as a combination bobbin and needle, the hook would at least be of no evident advantage in the kind of net-making above described.

after learning the specific gravity (2.765) I am compelled to conclude that they are probably of a silicious character. The objects are decidedly harder than any variety of serpentine I have ever seen."

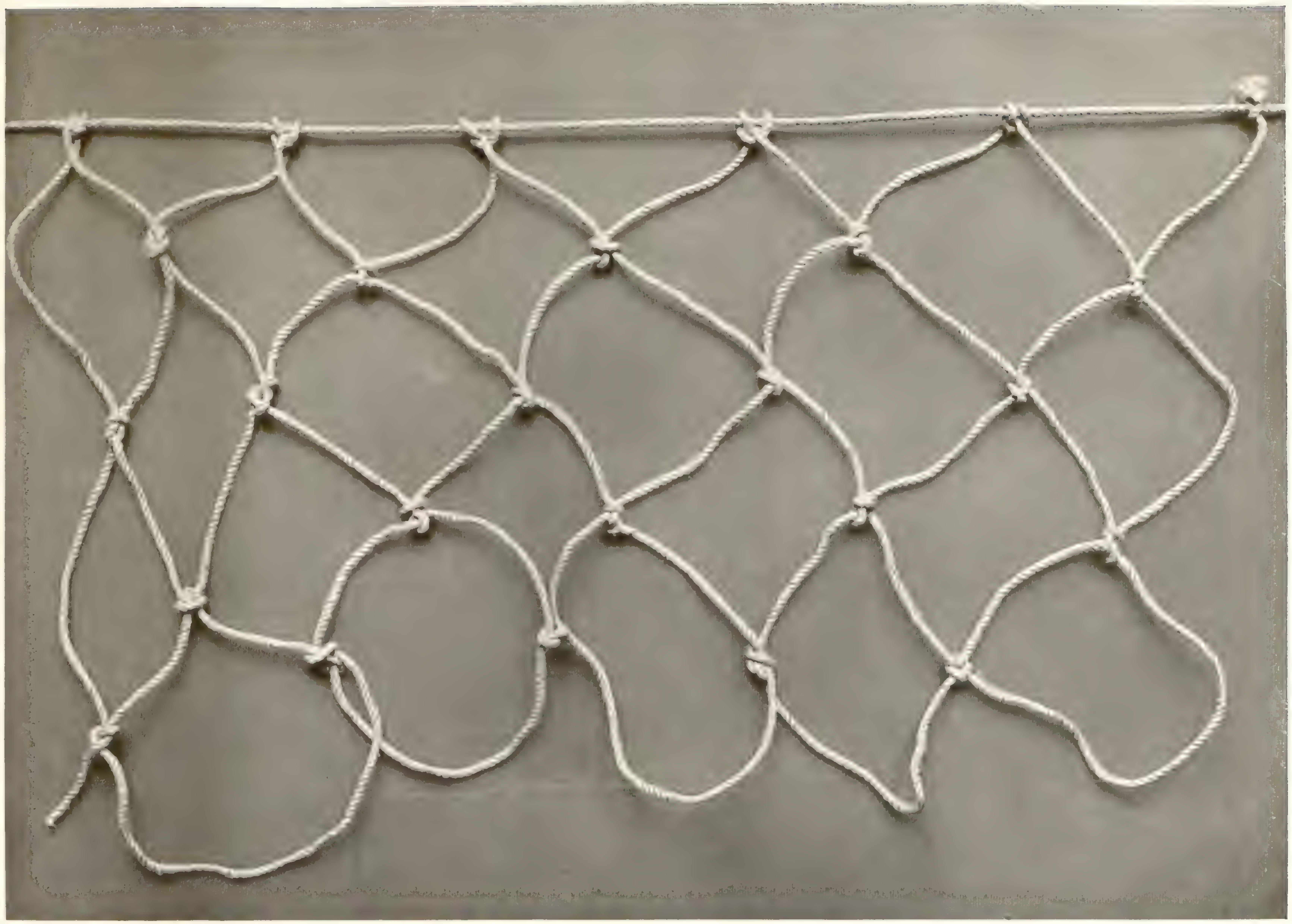

Fig. 1.—Section of net, made by Capt. J. S. Raybon with the aid of wooden models of a netting needle and a sizer from "The Indian Knoll." (One-half size.)

Our attention has been called to a description[1] with diagrams and illustrations, by Mr. William Churchill, authority on Polynesia, of a woman of New Britain, Papua, who, in making a net, worked only with a sizer and a ball of cord held in the hand. In the knot employed by her (the reef-knot, or ordinary square knot) the ball was not passed through the mesh.

Making use of a knot of this kind, which presumably the inhabitants of the Knoll are as likely to have devised as the Papuans, and using the cord wrapped around the base of a hooked implement, thus forming a kind of bobbin, a net can be made with ease and without undue delay, as we have determined by experiment, the presence of the hook being a decided aid in catching up the cord to form the knot as made by the Papuan, the bobbin end of the implement taking the place of the ball.

Moreover, the use of a combination bobbin and hooked implement probably would necessitate the attachment of something to the base of the implement to prevent the slipping off of the cord, and this would account for the presence of the hollowed space found there and hitherto not satisfactorily explained.

It may be added that a hooked implement not used as a bobbin but in conjunction with the ball of cord described as used by the Papuans would hardly be of any benefit, there not being sufficient space in the hand to accommodate both, and to lay down the ball in order to take up the hook would cause delay.

Although it would greatly support our original contention that the hooked implements found by us were netting needles, and consequently the objects of stone and of antler found with them were sizers, we have been unable positively to learn that a hooked needle has been used in place of a shuttle[2] or as a bobbin or in place of one, by aboriginal people, ancient or modern, in net-making where a knot is tied, although we have consulted a number of authorities, through their works or in person.

Lieutenant Emmons describes and figures netting needles resembling crochet needles, and consequently of the same class as ours, as in use among modern Indians of the Northwest coast.[3]

In a personal letter, however, Lieutenant Emmons writes: "Native tribes of the coast of Alaska used a netting needle just like those figured in my Tahltan writing, but in all instances I have observed these needles were used in the fine snowshoe filling. It is possible that their use might also have been applied to net-making in earlier days."

Mr. Charles C. Willoughby, whose valued assistance in our work we so greatly appreciate, aided by his thorough acquaintance with aboriginal life and his intimate familiarity with the rich collections of Peabody Museum of

[1] William Churchill, *op. cit.*, p. 83.

[2] As the reader probably is aware, cord is wound longitudinally on the shuttle, or is wrapped around the bobbin and thus is passed through the meshes with celerity.

[3] G. T. Emmons, "The Tahltan Indians," University of Pennsylvania, The Museum Anthropological Publications, vol. IV, No. 1, p. 56 *et seq.*

Harvard University, does not consider the suggestion offered by us in regard to the use of the needles and sizers can be the correct one from the fact that he believes a bobbin or a shuttle, similar to those now in use for net-making, was known to primitive peoples and probably to the inhabitants of "The Indian Knoll."

Mr. Willoughby, who thought at first, judging from descriptions and outlines, that the hooked implements might be distal ends of throwing sticks, after a prolonged and careful examination of the objects, now doubts if they were so used.

Lest any of our readers, especially our friends in Europe and in Argentina, where so many of our reports are sent, unable to make a personal inspection of these hooked implements, might, judging only from the illustrations, consider them to have belonged to throwing sticks, it may be well to remind them of the following points:

1. That the throwing stick, or positive evidence of its use,[1] has not been found anywhere in the region[2] in which is "The Indian Knoll."
2. That nearly all throwing sticks are of one piece, a construction that insures the required strength.
3. That small points of antler or of flint, which might have served as tips of the shafts used with atlatls, were not found associated with our discoveries.
4. That some of our hooked implements are too crooked to have been used on throwing sticks and that the cavities in some are too inconsiderable to have served for the insertion of the main part of the atlatl.
5. That the assumption that the hooked implements were parts of atlatls offers no explanation in regard to the large objects of stone and of antler found with the hooked implements and indubitably connected with them.

As a further aid in this question of the former use of the hooked implements and the objects of stone and of antler, which we sincerely trust others may take up, a résumé of the association of the so-called needles and sizers found in "The Indian Knoll" is here appended.

It may be well to point out, however, that when a needle was not present with a burial having a sizer, or when reverse conditions were encountered, there was usually a good reason to explain the absence of the object, namely: an aboriginal disturbance of the burial; a ceremonial breaking of the sizer where fragments of it were found but where probably parts of the needle, broken at the same time, less durable, had decayed away; interment in the shell material

[1] Dr. Charles Peabody found in Coahoma County, Miss., an object referred to as of bone, having at one end a hook and, at the other, part of a tenon for insertion, which is described as having belonged to an atlatl. "Explorations of Mounds, Coahoma County, Mississippi," Peabody Museum Papers, vol. III, No. 2, Plate XX.

[2] Prof. Marshall H. Saville writes: "I know of no examples of spear throwers outside of the Cliff Dwellers region and the sporadic find of Cushing at Key Marco in Florida. The Southwestern examples, of course, show Mexican influences. I do not consider, of course, the throwing-sticks of the eastern Eskimos or those of the Northwest coast Indians."

forming the upper part of the Knoll where the shells, pressing against the needles of antler, may have cut them, and the parts, possibly decayed, were confused with spiculæ of bone from the skeleton, also affected by the shells.

	Sizers.		Needles.
Bur. No. 2	stone	antler	.....
" " 20	stone	.....	needle
(Disturbed bones 28		antler	.....)
Bur. No. 29		2 antler	needle
" " 34	stone	.....	needle
" " 37	stone	.....	needle
" " 45	stone	.....	needle
" " 47	stone	.....	.....
" " 67	stone	.....	needle
" " 77		antler	needle
" " 82	stone	.....	needle
" " 84		antler	needle
" " 87	stone	.....	needle
" " 93	stone	.....	needle
" " 95	stone	.....	needle
(" " 99	½ winged stone	.....	.....)
" " 105	stone	.....	needle
" " 115	stone	.....	needle
" " 124		antler	needle
" " 161	stone	.....	needle
" " 163	stone	.....	needle
" " 202	stone	antler	needle with each
" " 211	stone	.....	needle
" " 216	stone	.....	needle
" " 219		antler	needle
" " 233		.....	needle
" " 236	stone	.....	needle
" " 251	winged stone	.....	needle
" " 259	stone	.....	needle
" " 272		2 antler	needle
" " 296		.....	needle

That part of Ohio river between Cairo, Illinois, where the river joins the Mississippi, and Evansville, Indiana, about 185 miles by water, forming the northern boundary of part of Kentucky, almost all the southern limit of Illinois and of a portion of Indiana, was carefully searched by our agents in advance of our investigation of it. Their report, rather discouraging, tallied with the result of our investigation. Sites still remaining along the river were found to be small and unimportant; mounds were few, considering the area gone over, and permission to investigate them was not always obtained, the larger ones being of vital importance in times of flood, and the smaller ones being regarded perhaps as receptacles of treasure or containing Indian relics to which an exaggerated value was attributed.

Mississippi river was covered by our agents before our visit to that part of it, twice from Memphis, Tenn., to New Madrid, Missouri, and once between the latter point and Cairo, Illinois, in all a distance of 230 miles by water.

About 35 miles of the river above Memphis was explored by us about five years ago, the results being given in a former report.[1]

The archæology of Mississippi river between Memphis and Cairo, with the exception of the enumeration of certain quadrangular mounds with flat tops, and of details of small ones, is mainly a memory of the past; one hears only of what used to be. The sites, prodded over, dug out, and constantly under cultivation, have yielded their treasures. Much of our investigation, moreover, along Mississippi river this season was hampered through high water cutting off access to sites and by excess of mud, rendering roads almost impassable.

As usual, we have forwarded to the Army Medical Museum, Washington, D. C., all pathological specimens obtained during our season's work, otherwise all skulls and skeletons saved have been sent to the United States National Museum. All other objects of importance found by us are on exhibition in the Moore Collection at The Academy of Natural Sciences of Philadelphia, except the collection of pottery from Hale's Point, Tenn., which has been presented to the Royal Ethnographical Museum, Stockholm, Sweden.

Dr. M. G. Miller was with the expedition as anatomist, as he has been throughout all our archæological work in the South, and has aided in putting this report through the press.

Mr. S. G. Weir, with us for the sixth season as general assistant, greatly aided us throughout this period, which proved to be of exceptionally hard work.

The Academy of Natural Sciences tenders its warm thanks to Dr. Gerrit S. Miller, Jr., curator, Division of Mammals, United States National Museum, for determination of the bones of lower animals; to Dr. Aleš Hrdlička, curator of the Division of Physical Anthropology, United States National Museum, for information as to skeletal remains; to Dr. H. A. Pilsbry and Mr. E. G. Vanatta, of The Academy of Natural Sciences, for identification of shells; to Mr. F. J. Keeley, curator of the Vaux collection, Academy of Natural Sciences, for determination of minerals and rocks;[2] to Dr. H. F. Keller for chemical tests; to Mr. Charles C. Willoughby, director of Peabody Museum of Harvard University, for valued assistance in many ways; to Miss H. N. Wardle for aid with the index; to Mr. F. W. Hodge, ethnologist-in-charge of the Bureau of American Ethnology, for literary revision of this report.

The Academy also warmly thanks all the owners of properties along Green river, lower Ohio river, and the Mississippi between Cairo, Illinois, and Memphis, Tennessee, who so courteously placed them at its disposal, and wishes to convey to them its great appreciation of their kindness.

All mounds and sites are described in order going up-stream.

Skeletons, unless otherwise specified, are of adults.

[1] "Some Aboriginal Sites on Mississippi River." Journ. Acad. Nat. Sci. Phila., vol. XIV, 1911.

[2] As the reader is aware, for absolute determination in such matters a small section cut from the stone is necessary. We need hardly explain that such a proceeding in connection with most archæological specimens is out of the question.

MAP OF PART OF GREEN RIVER, KY.

0 Scale in miles 10.

1916

SOME ABORIGINAL SITES ON GREEN RIVER, KENTUCKY.

The following mounds and sites are of most interest, among those investigated by us on Green river.

Mounds and Sites.

Site near Bluff City, Henderson County.
Site on the Austin Place, McLean County.
Site near Calhoun, McLean County.
Site near Smallhous, Ohio County.
"The Indian Knoll," Ohio County.
Mounds on the Annis Place, Butler County.
Mound on the Martin Place, Butler County.
Mound and site on the Cherry Place, Butler County.
Mounds near Little Reedy Point, Butler County.
Indian Hill, Edmonson County.

Site near Bluff City, Henderson County.

About one-half mile above Bluff City, between the highroad and the bluff and probably on the other side of the road also, though need to leave space for wagons to turn out prevented our digging there, overlooking the river, is ground considerably higher than the road, consisting of black soil, which proved to have been an aboriginal dwelling-site and a place of burial.

In the comparatively limited amount of digging done in the space necessarily so restricted, seventeen burials were found, exclusive of many scattered bones: eleven adults, two adolescents, four children, none so much as 3 feet in depth, some extending about 1 foot into underlying yellow clay otherwise undisturbed.

The adults and adolescents were in various forms of flexion, except one which lay at full length and four aboriginal disturbances whose form of burial was not determined.

With one burial were two very rude arrowheads or knives, of flint; a small one was with another burial. With the skeleton of an adult, in front of the face, was some pigment, doubtless iron oxide, and at the neck a small, rude, copper celt.

In the soil, apart from burials, were a small, grooved axe of sandstone; two piercing implements of bone; a stone of circular outline having a single pit on each side.

Site on the Austin Place, McLean County.

On the property of Mr. A. J. Austin, resident on the place, about four miles below the town of Rumsey, is a small, aboriginal dwelling-site visible from the river bank and easily distinguishable by its dark soil and the presence of a few shells scattered on the surface.

MESH-SPACERS. A, AUSTIN PLACE; B-I, INCLUSIVE, "THE INDIAN KNOLL."

A, SANDSTONE; B, QUARTZ, BUR. NO. 99; C, LIMESTONE, BUR. NO. 2; D, LIMESTONE, BUR. NO. 34; E, FERRUGINOUS FOSSILIFEROUS LIMESTONE, BUR. NO. 45; F, ANTLER, BUR. NO. 29; G, ANTLER, BUR. NO. 124; H, ANTLER, BUR. NO. 29; I, ANTLER, IN SOIL. (FULL SIZE.)

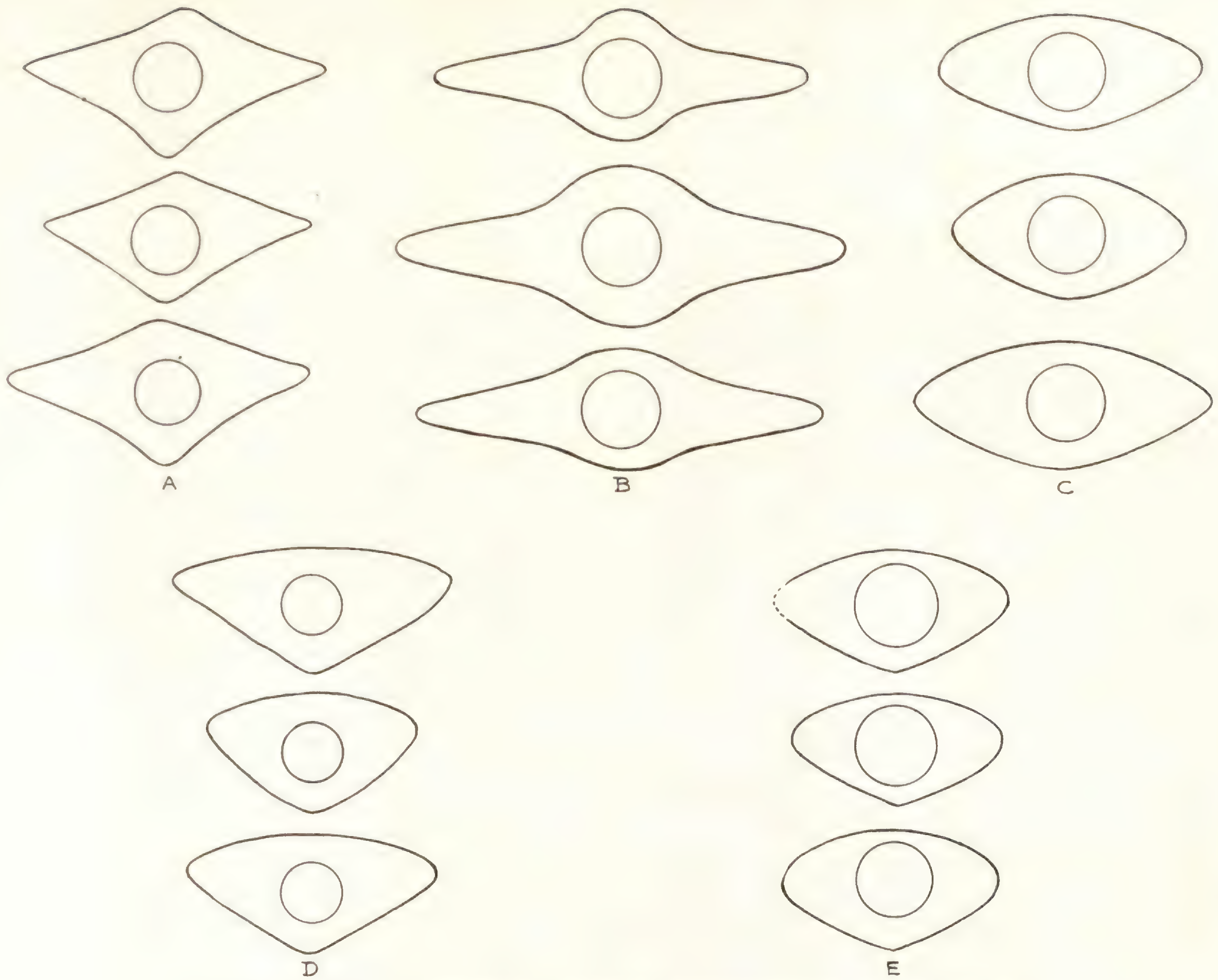

Fig. 2.—To face Plate IX. Cross-sections. The lettering corresponds to that on the Plate. (Full size.)

A limited amount of digging quickly came upon sixteen burials and some scattered bones. Twelve burials were closely flexed; two were disturbances, and two were burials of children, one somewhat disturbed. One of the flexed burials lay with the trunk on the back, the lower extremities closely flexed over it.

One skull in fragments was saved from this place, and a reunited femur.

A lancepoint and several arrowheads, of flint, lay near burials but not certainly with them. Some arrowpoints or knives, all of flint and all of coarse workmanship, were found apart from burials, as were several bone awls.

In the soil thrown out in digging at this place was an object of sandstone, shown in Plate IX, *A*, and in cross-section in Fig. 2, *A*, which, at the time, we supposed to be a banner stone, but which may have been, as the reader of the introduction will recall, a sizer used in the making of nets.

Fig. 3.—Sizer of antler. With Burial No. 16. Austin Place. (Full size.)

With Burial No. 16, the upper part of whose flexed skeleton had undergone disturbance, was a sizer of antler (Fig. 3) lying between the knees and the right elbow. No netting needle was found, though presumably its absence can be accounted for by the disturbed condition of the bones.

This site was not completely dug through, though seemingly the best parts of it were examined.

Site near Calhoun, McLean County.

In the outskirts of Calhoun is a farm belonging to Mr. G. W. Hull, who resides in the town. On part of this property is considerable high ground in sight from the river, on which is much dark soil, evidently once an aboriginal place of abode. Near here, it is said, was a ford where Indians formerly crossed the river.

Numerous buildings are now on this site, but through the courtesy of Mr. Hull we were permitted to dig in an extensive vegetable garden and on a slope between the dwelling-house and the river.

Sixteen burials were encountered, as follows: closely flexed, 9; partly flexed, 1; in a squatting position but tilted to one side, 1; extended on the back, 1; disturbances, 2; child, 1. Burial No. 14 lay with the trunk face down, the legs closely flexed to the right. The skull was missing.

Burial No. 2, partly flexed to the left, had, near the back of the neck, two tubular, shell beads, together, one, 1.5 inch in length, the other, .9 inch, the smaller having the perforation irregularly drilled so that its opening at one end is much to one side. At each ear was a pair of canine teeth of the wolf, all perforated for suspension at the proximal end. These teeth would make effective ornaments hanging, as they probably did, from both sides of the lobe of the ear. Under the right thigh were two knives and a large arrowhead of flint, not in a pile but near together.

Over the left elbow was a sizer of antler, with which was a netting needle of the same material (Fig. 4).

Burial No. 11, closely flexed to the left, had twelve discoidal beads at the neck, each about .75 inch in diameter.

A number of bone awls, several tools of flint, a globular stone of quartzite, and a small muller of claystone were found in the midden debris, as was the skeleton of a dog (*Canis familiaris*), while another lay in the underlying clay beneath the shell and midden debris which at this site was about 26 inches in depth.

FIG. 4.—Netting needle and sizer of antler. With Burial No. 2. Site near Calhoun. (Full size.)

SITE NEAR SMALLHOUS, OHIO COUNTY.

At the settlement of Smallhous, near the Louisville & Nashville railroad bridge, on the left-hand side of the river going up, is a property belonging to Mr. Frank Tichner.

On this property are a number of small rises in sight from each other and from the water when vegetation does not interfere. These rises, very irregular in outline of base and ranging up to about 10 feet in height, are on rolling land of uneven surface, showing results of wash in flood time, and themselves seemed to us probably to have been caused by swirl of water in periods of overflow.

Investigation, in one instance, came upon a bit of sandstone, a small fragment of pottery, an inconsiderable part of a bone of a lower animal, and what seemed to be small masses of charcoal. All these, however, we believe might have been included in material piled up by the action of water.

Digging in other rises yielded no objects indicating the agency of man.

On part of a ridge somewhat nearer Smallhous than the rises just described, has been an aboriginal dwelling-site as indicated by many broken shells on the surface and a few fragments and broken arrowpoints of flint. The soil, rich in organic matter, has a maximum depth of 30 inches.

A considerable number of trial-holes, but not sufficient to constitute an extensive investigation, came upon five burials. Three of these were flat deposits of human bones in no apparent order, having, respectively, one, four, and eleven skulls. A little above the largest deposit was a small, grooved axe of quartzite, which may have been placed with the burial or possibly had been lost in the period of the growth of the site.

The skeleton of an adolescent, extended on the back, lay 30 inches down on undisturbed, yellow clay; a burial closely flexed to the right was somewhat more than one foot below the surface.

"The Indian Knoll," Ohio County.

Beginning opposite the town of Paradise, which is across the river in Muhlenberg county, a property belonging to Mr. Jared Brown, of Paradise, extends for some distance along the left-hand side of the river, going up.

A short distance back from the river, on the Brown property, is a rise consisting of made-ground, between an acre and an acre and a half in extent, we were informed, which is locally well known as "The Indian Knoll." This Knoll is composed of dark soil, rich with admixture of organic matter, containing considerable shell in varying proportions scattered throughout, but nowhere forming nearly a homogeneous deposit. The maximum depth of this made-ground, the result of slow accretion during aboriginal occupancy, is 4 feet 7 inches.

There is no evidence or history of any previous digging for relics or treasure in "The Indian Knoll," and as the plow had not reached the graves, the elevation was practically intact, save in one respect. At the side facing the river there has been some wash in periods of high water, but to what extent the original size of the Knoll has been diminished cannot now be determined.

On the Knoll are several frame structures, of course precluding digging to the extent of the area occupied by them, but ample room for adequate investi-

gation was put at our disposal and Mr. Brown's courtesy to the Academy is greatly appreciated by it.

One hundred and seventy-nine hours, or about twenty-two and one-half workings days of eight hours each, with eight men to dig, were devoted by us to this interesting site, burials being found in practically all of its available extent with the exception of extreme marginal portions, where our work was not productive.

The graves at this place were in the main roughly circular or elliptical. Their size, as a rule, was somewhat limited, there being usually but little space in them beyond that needed to accommodate the skeletons which, as a rule, were closely flexed, purposely, no doubt, for economy of space.

In depth the burials ranged between one foot and 8 feet 5 inches,[1] many of them ending in the yellow sand (some being 2 feet, 3 feet, or exceptionally nearly 4 feet in it) on which rested the made-ground composing the Knoll.

Two hundred and ninety-eight burials were taken out[2] by us (exclusive of many scattered bones), which, so nearly as could be determined, were as follows: of adults, 183; of adolescents, 23; of infants and children, 92.

The adult and adolescent skeletons were: closely flexed, 128; partly flexed, 29; extended on the back, 1; aboriginal disturbances, 23; burials to be described particularly, 25.

Burials Nos. 7 and 9 had trunks lying on the back, shoulders elevated, heads on chests, humeri alongside the trunks, the elbows at the pelvis of each, the forearms closely flexed on the humeri, the femora vertical, with the legs closely flexed against them.

Burial No. 118 lay in a grave-pit, 7 feet 3 inches from the surface, the deposit of midden debris at that part of the site being 4 feet 7 inches in thickness. Presumably the grave had not been dug from the present surface but when the surface of the Knoll was at a lower level, and this most likely was the case with numerous burials at this site.

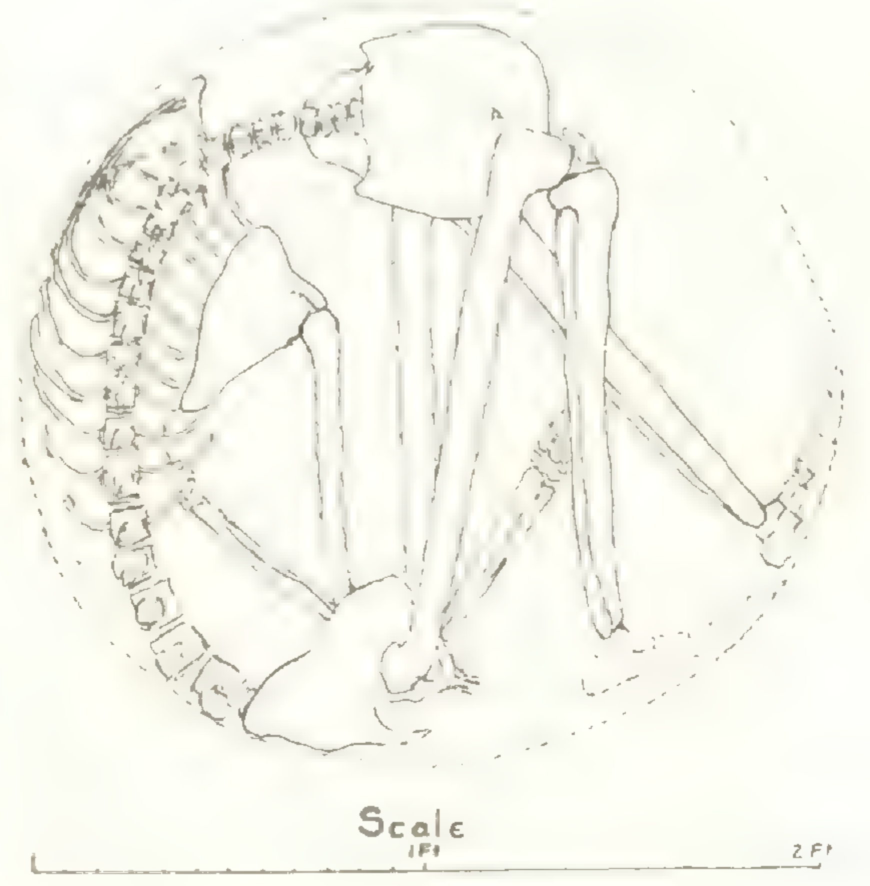

Fig. 5.—Burial No. 118. "The Indian Knoll." The skeleton lies flat on the bottom of the grave.

The skeleton (see diagram, Fig. 5) had been greatly bent to accommodate it to the restricted dimensions of the grave which, so far up as it was traceable, had diameters, roughly-circular, 23 inches by 25 inches.

[1] One grave, which partly filled with water during a high stage of the river, may have been even deeper than this.

[2] In one instance a veritable tangle of burials at considerable depth necessitated great enlargement of the area uncovered. This, by several days' work, had nearly been accomplished when, after the close of our working hours, a constant and affable spectator, in the presence of three companions—a mule and two bipeds, all intoxicated except the one customarily designated a beast—with the aid of a shovel obtained from us ostensibly for another purpose, dug down to the skeletons and removed them.

Sixty-six skulls, often with most of their skeletons, were saved, conditions at this place being favorable, on the whole, for while skulls lying in the midden deposit were often crushed, and sometimes otherwise more or less injured by shells and bits of stone forced into the facial parts, those in the sand beneath the deposit rested in soft material containing no shells and doubtless had been reinforced through infiltration of lime salts from above.

The fact that many of the graves seemingly had been made at various stages in the growth of the mound and that often a considerable depth of deposit had formed above where their inception presumably was, and the knowledge that among a very large number of artifacts discovered by us, none in any way indicated contact with Europeans, argues a considerable age for the skulls from this place.

These crania and other bones, sent by us as a gift to the United States National Museum, have been examined in a preliminary way by Dr. Aleš Hrdlička, who writes that the crania are "typical, undeformed, Algonquin skulls," and adds that they are "evidently not Shawnee, although coming from the region ascribed in general to that tribe." In another communication Doctor Hrdlička writes: "None of the skulls is deformed and their type is that of the Algonquin. . . . The location is in the region still generally ascribed to the Shawnee, but the remains evidently represent another tribe. This may have been the Miami, or one of the tribes from Illinois, or one of the Lenape."

Throughout the digging, as will be detailed later, a number of skeletons of dogs were found, of which Dr. Gerrit S. Miller, Jr., writes: "I am particularly glad to see the dogs, as their perfect similarity in essential characters to modern European dogs helps to confirm my idea that all domestic dogs had a common origin."

Artifacts with burials in "The Indian Knoll" were comparatively numerous, but unfortunately present little diversity, the so-called netting needles and their sizers being, of course, the feature of the place. Shell beads were with many burials, as we shall see, and were in a wonderful state of preservation, owing, no doubt, to the presence of lime salts from the shells in the midden debris, which presumably exerted so strengthening an influence on the skulls. Globular beads of shell were not found; fine tubular shell beads, from .5 inch to 1.6 inch in length, were encountered, and quantities of discoidal ones, ranging from minute beads only .1 inch to others a full inch in diameter. There are flat beads almost annular, the perforations being .5 inch in a total diameter of .85 inch. Numerous lots of beads were made from fresh-water univalves (*Anculosa prærosa; Anculosa*, a small, undetermined species), and one lot from the marine univalve *Marginella apicina*. All these were ground on one side to allow stringing.

A feature of this place, in connection with the shell beads, was that nearly all the various lots found with burials were accompanied with other beads, of jet or of red claystone, the jet beads being sometimes singly with a deposit, sometimes two or three. Most of the jet beads are barrel-shaped, the largest found

being 2.1 inches in length; exceptionally they are discoidal, and about .7 inch in diameter. Examples of jet beads from the Knoll are shown in Plate XII.

The beads of claystone are tubular, barrel-shaped, globular, and discoidal. They vary considerably in size, and occasionally a number were with a single burial, nineteen, we believe, being the maximum. A fine globular bead of claystone, much larger than others of the same kind, is shown in Plate XII.

Beads of claystone and of jet were seldom found in the same deposit, though once a bead of jet and five much smaller ones of claystone, were with shell beads.

In one instance a bead of jet, more than one inch in length, was accompanied with a shell bead of about the same size, and on a single occasion a tubular shell bead more than 1.5 inch long took the place of a jet or of a claystone bead with a deposit.

There were also with burials some shell gorgets, most without decoration, a few, however, showing line and punctate work very rudely executed.

With a number of the deposits of beads, and usually found in pairs, were curved strips of shell cut from the bodywhorls of large marine univalves, similar to those shown in Plate XII. These ornaments, pierced at one end for suspension, in a few instances were found at each side of the head and may have been used as ear ornaments, but in other cases they lay near the neck with beads and apparently had been strung among them; in fact the impression of a bead was in one instance found alongside the perforation of one of these ornaments.

Also strung among the beads, as was done by the Caribs of British Guiana, and elsewhere, were canine teeth of carnivores, perforated for suspension, the greatest number found at the Knoll with any one lot of beads being eight. The teeth from the Knoll have been identified by Dr. Gerrit S. Miller, Jr., as belonging to the wolf, the coyote, and the bobcat (*Lynx rufus*). Doctor Miller writes: "I was struck by the absence of dog's teeth among the ornaments. While I have no doubt about the determination of the coyote and lynx, it must always be remembered that dog and wolf are separated by size only; hence in dealing with a single tooth there is always possibility of an error. In the case of this carnassial I think that such possibility is at its minimum."

Some lanceheads, and a fair number of arrowheads and knives, difficult to differentiate owing to the considerable size of all the pointed flints at this place, were present with burials. All are of flint, of dark shade as a rule.

In the midden debris were numerous other lanceheads, arrowheads, and drills of flint, and a number of arrowheads of antler, some broken. A selection of flints from "The Indian Knoll" is shown in Fig. 7.

No celts were found by us in the Knoll, with the sole exception of a diminutive one but 2.1 inches in length, though fifteen grooved axes were unearthed, none more than 6.5 inches in length, two distinctly with burials, the others, badly battered as a rule, scattered in the midden deposit. These axes, most of limestone though one at least is of sandstone, evidently took the place of celts in the aboriginal life on the Knoll.

Fig. 7.—Lancepoints, arrowpoints, knives, scrapers, drills, of flint. "The Indian Knoll." (Full size.)

Near a post-hole which apparently had been connected with the site, lay a grooved axe almost 5 feet below the surface, the deposit being 3 feet 6 inches in thickness at this place. Presumably the axe had been connected with the making, or the driving down, of the post and was lost or forgotten.

There were also found a number of pestles of limestone, not connected with burials as a rule, some about 1 foot in length and all unsymmetrical and carelessly made. A large number of mullers were present in the debris, in two instances three of them lying together. These mullers, nearly all of limestone, though one is of gneiss, one of ferruginous claystone, two of quartzite, are most of them badly battered and chipped. Some are too small to have served for the grinding of maize, except, perhaps, as toys. A number have centrally round depressions and had been used also as hammerstones, perhaps for the cracking of nuts, though no pitted stones were found in the site.

As might be expected, awls, pins, and various other objects of bone were present in the debris, while some were found with burials. A selection of these objects, many of which are in excellent condition, including a fish-hook, is shown in Fig. 8.

With four burials in the Knoll, all of infants or of young children, were five tubes of bone, the longest about 6.7 inches, the two shortest, found with the same burial, each 4.5 inches long. The diameter common to all is about .8 inch. As will be described in our account of the burials, all these tubes are highly polished and all have been worked down exteriorly and cleared out within.

While there was no evidence or history of any digging in recent times in the Knoll, aboriginal disturbance through intersection of graves was frequently noted in parts of it, and this fact doubtless accounts for the finding, in the midden debris, of several sizers and netting needles of antler, always separately. Of course, some of these may have been lost during the growth of the site, as other objects were, though the aborigines inhabiting the Knoll seem to have parted with very little of value through inadvertence.

While the makers of "The Indian Knoll" knew the use of copper in the manufacture of ornaments, they possessed but little of it, as will be noted in the detailed list of objects found with burials; and the use of pottery also seems to have been very limited at this place, only a few small fragments, some bearing a rude decoration, having been found in the entire site. These fragments were in the midden debris comparatively near the surface, though probably small bits were scattered throughout the deposit.

It is probable that the inhabitants of the Knoll used vessels of wood to a considerable extent. Small masses of sandstone, which had to be brought from some distance, were scattered in numbers throughout the debris. These, heated, may have been used to cause water to boil.

No pipe or fragment of a pipe, either of earthenware or of stone, was found by us in "The Indian Knoll." A visitor, however, showed us an object of sandstone which he said he had just picked up on the surface near the Knoll. Into

Fig. 8.—Objects of bone—ornaments, awls, pins, fish-hook, etc.—also a spearhead of antler. "The Indian Knoll." (Full size.)

this object, about the size of a small hen's egg, a bowl had been drilled, and a perforation at right angles to the bowl. In making the latter, however, a part of the mass had been broken off. Unquestionably this object was a pipe ruined in the making, though we cannot say that it belonged to the period of the growth of the Knoll.

As this site is by far the most important one on Green river, so far as the stream was investigated by us, we shall describe each burial with which artifacts were found, and other burials in any way noteworthy.

Burial No. 2, closely flexed to the left. At the neck were discoidal beads of shell, and a bead of jet, 1.4 inch in length, also spires of two marine shells, pierced for suspension. On the left humerus were small shell beads and a sizer of antler (Fig. 9, *I*). On the thorax lay a sizer of limestone (Plate IX, *C*). On the pelvis were fragments of a rattle made probably from the shell of a tortoise, perforated for suspension, which had contained a quantity of small pebbles. A lancepoint of flint, 4 inches in length, lay near this burial and perhaps belonged to it.

The burial was in the midden debris at a place where a considerable proportion of shells was mingled with it, and these shells, we think, may have cut and broken the needle or needles of antler which probably accompanied the sizers, and the spiculæ of antler may have been mingled with fragments of bone, as the burial at this place had been badly injured by the shells.

Burial No. 4, closely flexed to the left, lay in a grave 4 feet 10 inches deep, one foot of which was in the underlying sand on which the Knoll had grown. Above the skull was some red pigment (iron oxide), and below the cranium, a small quantity of charcoal.

Burial No. 6, an aboriginal disturbance, had associated small, shell beads and a lancepoint of flint.

Burial No. 13, a child, had a few shell beads at the neck.

Burial No. 15, closely flexed on the right, had at the neck, a few discoidal shell beads, two of which, together, were considerably larger than the rest, each being .75 inch in diameter.

Burial No. 18, closely flexed to the right. Near this burial lay a pestle. Pestles, mullers, and objects of bone were so numerous in the midden debris at this site that there is no certainty that this pestle belonged to the burial near which it lay.

Burial No. 20, a young child, lying on the yellow sand, the original surface, which at this point was 3 feet 10 inches deep. With the remains were a netting needle of antler (Fig. 10, *E*) and its sizer of limestone (Plate X, *A*; shown in cross-section, Fig. 11, *A*).

The finding of a sizer and a netting needle with so young a child would seem rather out of place did we not know that sometimes relatives and friends seem to have contributed objects of their own at burials, as, for example, in a moment of expansion, one might put with a small child, a pipe or a weapon.

Fig. 9.—Sizers of antler. *A*, Bur. No. 272; *B*, no burial; *C*, Bur. No. 77; *D*, Bur. No. 219; *E*, Bur. No. 84; *F*, Bur. No. 272; *G*, Bur. No. 28; *H*, no burial; *I*, Bur. No. 2; *J*, Bur. No. 202. "The Indian Knoll." (Full size.)

Fig. 10. Netting needles of antler. *A*, Bur. No. 296; *B*, no burial; *C*, Bur. No. 124; *D*, Bur. No. 259; *E*, Bur. No. 20; *F*, Bur. No 272; *G*, Bur. No. 28; *H*, Bur. No. 82. "The Indian Knoll." (Full size.)

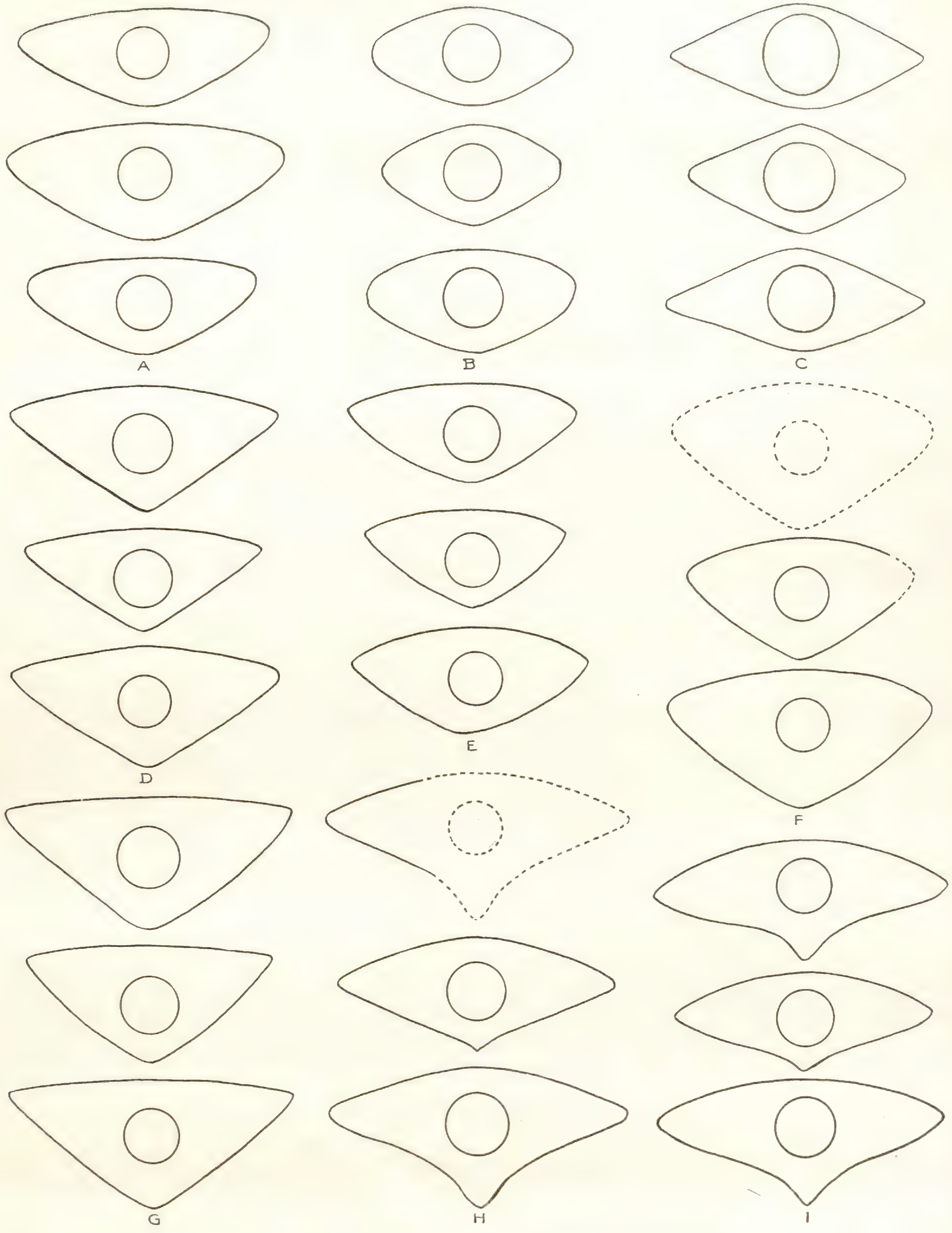

FIG. 11.—To face Plate X. Cross-sections. The lettering corresponds to that on the Plate. (Full size.)

A

B

C

D

E

F

G

H

I

M.L.BAKER

MESH-SPACERS. "THE INDIAN KNOLL."

A, LIMESTONE, BUR. NO. 20; B, BANDED CLAYSTONE, BUR. NO 161; C, CHALCEDONY, BUR. NO. 163; D, GRANITE, BUR. NO. 115; E, QUARTZ, BUR. NO. 82; F, GNEISS, BUR. NO. 259; G, SILICIOUS MATERIAL RESEMBLING JADE, BUR. NO. 216; H, COARSELY CRYSTALLINE ROCK, BUR. NO. 87, I, SILICIOUS ROCK, BUR. NO. 67. (FULL SIZE.)

Burial No. 22, partly flexed to the left. At the right of the pelvis, together, were two piercing implements, evidently of avian bones, and a small muller.

Burial No. 27, closely flexed to the right. At the right of the skull, together, were: three implements of bone, one with pointed end, the others with rounded ones, perhaps used in basketry; two arrowheads or knives, of flint, as were all such objects at this place; a drill; the pointed end of a large flint weapon or tool; a rude or unfinished knife. On the left humerus and on part of the thorax was a mass of pure clay, recalling a custom observed in connection with some aboriginal burials along Tennessee river.[1]

Burial No. 28, closely flexed to the right. Around the neck were many discoidal beads, each slightly less than one inch in diameter, while numerous tubular beads of shell, the largest ones about 1.5 inch in length, encircled the pelvis.

With this burial were many bones in no order, including four skulls, having in association: a lancehead 4 inches long; six discoidal shell beads; a long, bone implement showing considerable workmanship (Fig. 8, to the reader's left); a long pin in a fine state of preservation; a sizer of antler (Fig. 9, *G*).

Burial No. 29, adolescent closely flexed. Together on the right humerus was the following miscellaneous assortment: a small mass of glauconite, or green earth, probably used as a paint; three incisors of a woodchuck (*Marmota monax*); a small amount of red pigment (hematite); a small, imperforate object of shell, elliptical in outline; two lanceheads or knives about 3.5 and 4.5 inches in length, respectively; a netting needle of antler (Fig. 12, *F*); two sizers of the same material (Plate IX, *F*, *H*).

Burial No. 31, a disturbance. Near the neck were small shell beads and part of a pin made from a bone of the deer.

Burial No. 33, a disturbance. In association with the bones were: minute shell beads; five large discoidal ones; a barrel-shaped bead of claystone, 1.25 inch in length; part of a large weapon of flint.

Burial No. 34, a disturbance. Shell beads were near the head in great numbers, discoidal, minute and large. With these were shell ornaments, one at each side of the skull, and one over the right shoulder, being sections of the body-whorl of the marine shell *Busycon*, each about 3.75 inches long by 3.5 inches wide, having two perforations at one end and one in the center. These rude gorgets were without decoration. At the neck and on the upper part of the thorax were shell beads and a bead of jet, barrel-shaped, 2.1 inches in length (Plate XII). With the shell beads were two other beads of jet and one of claystone; also parts of two curved strips of shell; a long bead of shell partly perforated; four canines of the wolf, perforated at the proximal end for suspension, which evidently had been strung among the beads.

Lying on the right side of the thorax, its long axis corresponding with that

[1] C. B. Moore, "Aboriginal Sites on Tennessee River," *passim*. JOURN. ACAD. NAT. SCI. PHILA., vol. XVI.

of the skeleton, was a sizer of limestone (Plate IX, *D*), its needle of antler, much broken, in association.

Burial No. 36, a child, having associated shell beads, large, medium, small, and minute, with others made from an undetermined species of the river univalve *Anculosa*. With this burial also were traces of red pigment, and the shell of a tortoise containing pebbles—a rattle.

Burial No. 37, closely flexed on the right, bringing the right knee and elbow together, near which lay a netting needle of antler (Fig. 13, *A*) and its sizer of claystone (Plate XI, *C*, shown in cross-section, Fig. 14, *C*) which apparently had been broken ceremonially, as parts of it were separated one from another by at least 6 inches.

Burial No. 38, a young child having at the neck a considerable number of beads wrought from the river shell *Anculosa prærosa*.

Burial No. 39, closely flexed on the left. Under the skull, piled on one another, were three undecorated ornaments of shell, one badly broken, rude gorgets similar to those already described in connection with Burial No. 34.

Burial No. 42, adolescent, closely flexed to the left. At the right shoulder was red pigment (iron oxide), and shell beads extended down the right side.

Burial No. 43, partly flexed on the right. At the pelvis were shell beads and a barrel-shaped bead of jet.

Burial No. 45, lying partly flexed on the left, had the upper part of the trunk prone. Extending around the neck were shell beads having at intervals among them, four canine teeth of the coyote, with perforations in the proximal parts.

Under the middle part of the thorax was a sizer of fossiliferous, ferruginous limestone (Plate IX, *E*), and immediately alongside it, its needle of antler (Fig. 12, *A*). Near these, on the chest, were many shell beads, and others were along the forearm.

Burial No. 47, extended on the back, at the bottom of a grave nearly 6 feet from the surface, the thickness of the midden deposit at this point being 3 feet 9 inches, so that the pit extended about 2 feet into the yellow, underlying sand. Beads of shell were on the temple, under the skull, at the neck, and on the chest, some, perhaps, displaced from their original positions at the time of the interment. With the shell beads were three fine, barrel-shaped beads of jet, the largest shown in Plate XII. Between the femora and beyond the pelvis were two curved strips of shell of the kind often found among the beads at this place, this deposit being probably a gift and placed hastily without regard for position. On the thorax, below the neck, was a sizer of quartz (Plate XI, *A*). Most careful search failed to come upon the expected needle of antler, and no disturbance or deposit of shell in the grave was present to explain its absence.

Burial No. 48, a disturbance accompanied with shell beads and two lance-heads of flint, 4.75 inches and 3.5 inches in length, respectively.

Burial No. 51, that of a child about ten years of age, had three undecorated

Fig. 12.—Netting needles of antler. *A*, Bur. No. 45; *B*, Bur. No. 236; *C*, Bur. No. 216; *D*, Bur. No. 202 (with the antler sizer); *E*, Bur. No. 202 (with the stone sizer); *F*, Bur. No. 29; *G*, Bur. No. 163. "The Indian Knoll." (Full size.)

FIG. 13.—Netting needles of antler. *A*, Bur. No. 37; *B*, Bur. No. 93; *C*, Bur. No. 67; *D*, Bur. No. 77; *E*, Bur. No. 161; *F*, Bur. No. 95; *G*, Bur. No. 233; *H*, no burial. "The Indian Knoll." (Full size.)

MESH-SPACERS. "THE INDIAN KNOLL."

A, QUARTZ, BUR. NO. 47, B, QUARTZ, BUR. NO. 251, C, CLAYSTONE, BUR. NO. 37, D, CLAYSTONE, BUR. NO. 93; E, LIMESTONE, BUR. NO. 211, F, BANDED CLAYSTONE, BUR. NO. 105; G, SILICIOUS MATERIAL RESEMBLING JADE, BUR. NO. 95, H, QUARTZ, BUR. NO. 202; I, GABBRO, BUR. NO. 236. (FULL SIZE.)

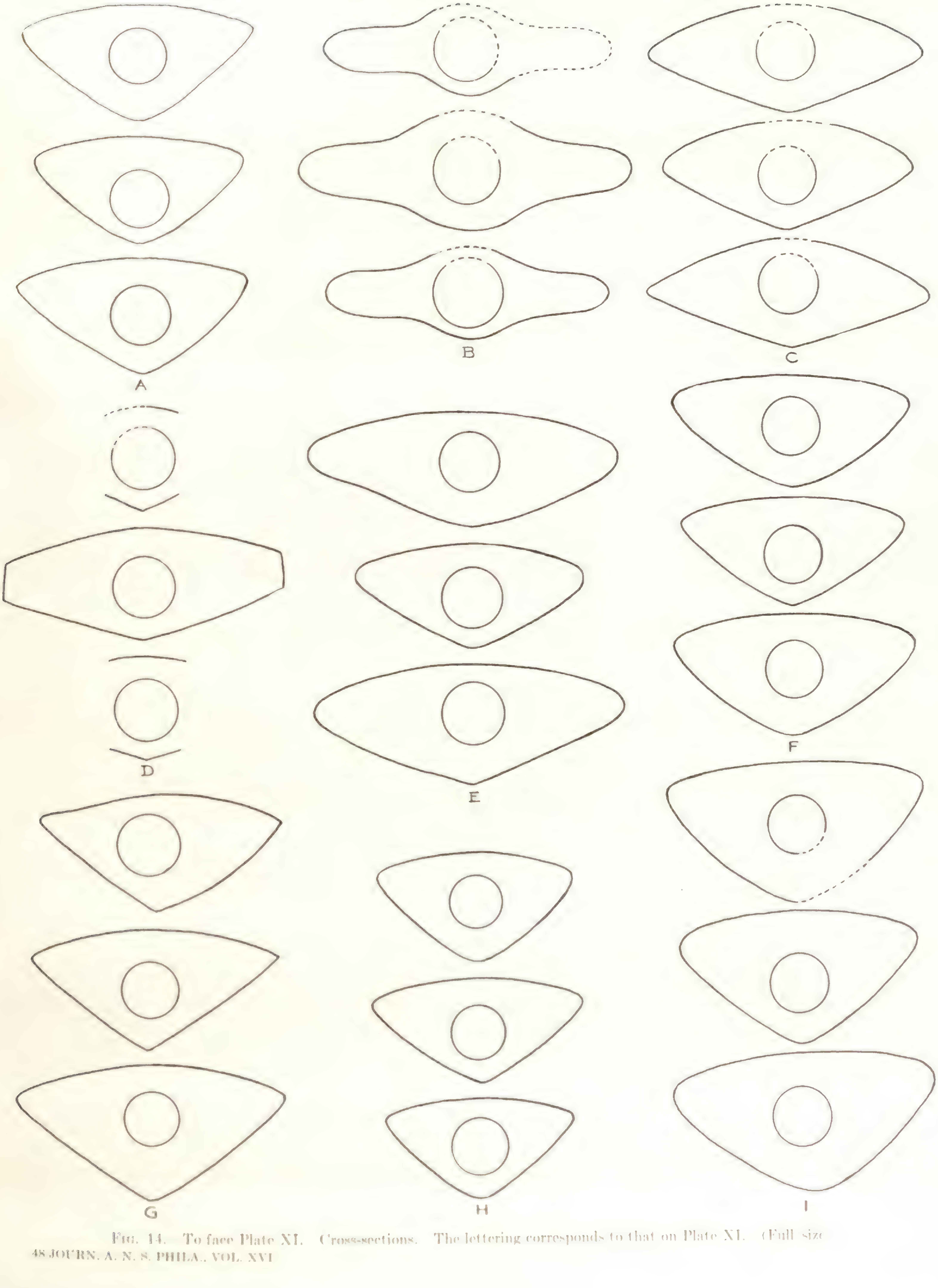

Fig. 14. To face Plate XI. Cross-sections. The lettering corresponds to that on Plate XI. (Full size

shell gorgets similar to those found with Burial No. 34, which presumably had been arranged around the neck, judging from the position in which they were found.

Burial No. 52, closely flexed on the left. Near this skeleton was part of that of a dog, the rest having been removed by a neighboring burial with which other bones belonging to the same dog's skeleton were found. At the back of the neck of Burial No. 52 was an object of limestone, 4.1 inches in length, somewhat resembling a bar amulet, but without perforation.

Burial No. 53, closely flexed on the right, lying at the bottom of a grave 5.5 feet from the surface and extending about 2 feet into the underlying, yellow sand, had a piercing implement of bone on the pelvis.

Burial No. 56, closely flexed on the right, had at each ear a curved ornament of shell of the kind already several times described. At the top of the skull was a mass of gray clay, probably a pigment, and a rude implement of flint.

Burial No. 60, an infant in a grave pit, having shell beads at the neck, among which was a long, tubular one of shell, a central piece, no doubt.

Burial No. 61, closely flexed on the left, having a mass of pigment (hematite) at the right of the skull.

Burial No. 62, an infant. Near the head were shell beads and two of the curved strips of shell well known at this place.

Burial No. 64, a child lying with the skeleton next to be described, that of an adult. On the chest of the child, hanging downward and extending over on the pelvis of the adult, where presumably they had swung at the time of burial, was a rouleau of discoidal beads of shell, each about .7 inch in diameter, having centrally in the string a barrel-shaped bead of jet and terminally an ornament of copper about 4 inches in length, somewhat resembling a small, ceremonial blade. At the cutting edge, however, is a perforation for suspension. Many small, shell beads were on the chest.

Burial No. 65, closely flexed on the left, had on the pelvis a bone pin and two incisors of the beaver.

Burial No. 67, partly flexed to the right. Near the skull was an arrowhead or knife. On the right side of the thorax lay a netting needle of antler (Fig. 13, *C*), between the closely flexed forearm and the ribs. Some distance away, on the upper part of the pelvis, lay a beautiful sizer of silicious rock (Plate X, *I*).

Burial No. 71, closely flexed on the left, had on the pelvis a lancehead or knife, of flint, about 3 inches in length.

Burial No. 72, closely flexed on the left. Near the skull were two lanceheads or knives, respectively about 3.5 inches and 4 inches in length, and another nearby 4.25 inches long. Under the thorax was a mass of gray clay, probably a pigment, and under the left shoulder was an object of fine-grained sandstone, which seems to have been part of a small sizer, an indication of the original perforation remaining on one side of the object as it now is. An effort apparently was made to drill a hole longitudinally through it, but the attempt was abandoned

(Fig. 15). With this were several bone pins, all broken. An arrowhead or knife of flint lay near the left forearm.

Burial No. 73, closely flexed to the right, had spread on the left thigh: a bone fish-hook, shown in Fig. 8; eight arrowheads or knives; part of another; two fragments of antler; jawbones of the woodchuck (*Marmota monax*); two bits of flint.

Burial No. 75, partly flexed on the right, had at the neck two curved, perforated strips of shell, and a similar one on the chest.

Burial No. 76, adolescent, closely flexed to the left. The skeleton lay on the bottom of a grave-pit, 6 feet 9 inches from the surface. The midden deposit at this place was 3 feet 5 inches thick, so the bones lay 3 feet 4 inches deep in the underlying, yellow sand. Shell beads and tubular beads of bone were around the neck; shell beads were at the left wrist. A flint knife lay at the pelvis.

FIG. 15.—Incomplete ornament of fine-grained sandstone. With Burial No. 72. "The Indian Knoll." (Full size.)

Burial No. 77, closely flexed on the right. Under the right side of the thorax lay a netting needle of antler (Fig. 13, *D*), and immediately with it a sizer, also of antler (Fig. 9, *C*).

Burial No. 78, a child. At the head were: two undecorated shell gorgets; a mass of glauconite, or green earth; a drill and probably a knife, of flint.

Burial No. 80, closely flexed on the left, had at the neck shell beads and a large barrel-shaped bead of jet.

Burial No. 82, a child about five or six years of age. Apparently a double string of shell beads had been placed around the back of the neck and continued down on each side of the chest in front to just above the pelvis, where they united. At this point lay a sizer of quartz (Plate X, *E*), its long axis corresponding with that of the child's body, some of the beads lying under the upper end of the sizer. With the sizer was its netting needle of antler (Fig. 10, *H*). About half-way down the strings of beads, on each side, was a barrel-shaped bead of jet.

Curved shell ornaments, perforated strips of shell, were, one at the right shoulder, another about 4 inches away in the sand (Plate XII), the ornament nearest the skeleton lying among the beads.

Burial No. 83, closely flexed on the left, having on the pelvis an arrowhead or knife, of flint.

Burial No. 84, closely flexed to the right. At the outer side of the left shoulder in a heap and in no order, were: a rude, blunt tool of limestone; a grooved axe of limestone; a bone awl; three arrowheads or knives and two drills, all of flint; a fragment of flint; a number of unworked bones, mostly of the deer but some having belonged to birds, many broken; a sizer of antler (Fig. 9, *E*); its netting needle of antler, lying with it, too much crushed and decayed for exact restora-

tion. Even the sizer had been injured by juxtaposition with the tools of stone. Asphalt found in the cavity of the needle and tested by Doctor Keller, is described in the Introduction.

"The Indian Knoll," it should be remembered, is not, properly speaking, a mound, but a dwelling-site, and the finding of a grooved axe in it has no bearing on the question as to whether or not grooved axes were placed in mounds.

Burial No. 87, a child. On the chest lay a sizer of coarsely crystalline rock (Plate X, *H*), which had been broken longitudinally and across, but not by a blow that had crushed or chipped in any way, leaving four parts about equal in size. Three of these parts lay almost together, the fourth was not found, and, presumably, when the ceremonial breaking occurred, the portion was left elsewhere. It seems hardly necessary to say here that when part of a sizer was not recovered the matter was not lightly passed over or abandoned until after a thorough search. Near the skull, upright, was the thicker or hollow end of a netting needle of antler. The burial of an adult lay immediately above that of the child under description, and it is likely that its position may account for the loss of part of the needle and even for that of the fragment of sizer.

Burial No. 92, adolescent, closely flexed on the right. At the pelvis were a few shell beads made from *Anculosa prærosa* and an undetermined species of *Anculosa*, river univalves. With these were two beads of jet.

Burial No. 93, partly flexed, the upper part of the trunk face-down, throwing the knees to the left. At the neck were shell beads and two of jet. Near the left elbow, over the left femur, and on the trunk were fragments of a large marine shell, seemingly broken ceremonially and scattered.

In the angle between the knees and the trunk of the skeleton, at the edge of the grave, was a sizer of claystone (Plate XI, *D*), broken but with all parts present except one. Its needle of antler lay with it (Fig. 13, *B*). With these were: a spearpoint of antler; a small mass of glauconite; a lump of powdered hematite; a bone pin; several fragments of flint; the pointed ends of four lance-heads and the lower part of one of them, all of flint. With these fragments was a rude arrowhead which readily could have been made from part of a lance-point such as were found.

Burial No. 95, closely flexed to the right, lying on the bottom of a pit 5 feet 10 inches from the surface. The midden deposit was here 4 feet 2 inches in thickness, and the burial lay 1.5 foot deep in the yellow sand. At the outer side of the left humerus lay a netting needle of antler (Fig. 13, *F*). Its sizer, of silicious material resembling jade (Plate XI, *G*), was found in the sand near the pelvis. Shell beads encircled the left elbow.

Burial No. 97, closely flexed on the right. On the upper part of the left side of the thorax were a flint knife and a bone awl.

Burial No. 99, adolescent, closely flexed on the left. At the neck were shell beads in great numbers (*Anculosa prærosa* and the undetermined *Anculosa*) continuing down the upper part of the thorax.

On the vertebræ, below the chest, were three parts of a winged stone of quartz (Plate IX, *B*), representing about half the ornament. It is very unlikely that the remainder of this object had been with the fragments found, as our digger had come upon a part of the skeleton remote from where the object lay, without disturbing the bones, which were entirely removed with a trowel. Moreover, all the surrounding soil was conscientiously sifted without success. Here we have another instance of ceremonial breaking apart from the burial and failure to inter all the fragments. No netting needle was found with this winged stone, though later in the digging we met this type associated with a netting needle.

Burial No. 101, a child having shell beads at the neck.

Burial No. 103, closely flexed to the left. At the face was an ornament of copper, 6 inches long, centrally perforated and somewhat resembling a bar amulet in outline. Shell beads, including a barrel-shaped one of jet, were at the neck.

Burial No. 104, partly flexed to the left. At the right wrist were discoidal shell beads and perforated river univalves (*Anculosa prærosa*). Evidently strung with these beads were eight canine teeth of the wolf, having each a perforation in the proximal end.

Burial No. 105, a young child. Around the neck were a few shell beads and two of the curved strips of shell common at this place, one somewhat shorter than the other, as we sometimes found them; also two canine teeth of the wolf, each having two perforations in line at the proximal end.

At the left shoulder was a netting needle of antler too badly decayed for exact restoration, and its sizer of banded claystone (Plate XI, *F*).

Burial No. 109, a child. At the neck were shell beads and one of jet accompanied with a large shell bead, evidently a companion piece. On the chest, probably having been suspended from the bead necklet, was a gorget of shell, badly crushed, having had a small, rude decoration of three parallel lines enclosing two rows of punctate marks.

Burial No. 110, closely flexed to the left. At the neck and on the upper part of the chest were shell beads and two beads of jet. At each side of the head was a curved, perforated strip of shell, of the kind common at the Knoll, seemingly ear-ornaments in this instance.

Burial No. 113. Closely flexed on the left. At the left side of the thorax was a small quantity of hematite pigment.

Burial No. 114, a young child, having a necklet of shell beads interspersed with four perforated, canine teeth of the bob-cat (*Lynx rufus*). With the beads, apparently as a central ornament, were two of the well-known strips of shell. About 6 inches from the feet of the skeleton was a bone tube 5.25 inches in length, apparently polished by use, as are the other four tubes from this place. Six inches distant from the skeleton was the shell of a turtle or of a tortoise, broken, a rattle, containing pebbles unusually large, some having the size of the end of one's little finger.

Burial No. 115, adolescent, closely flexed to the right. Shell beads, a bead of jet, and two perforated canine teeth of the wolf were at the neck.

Between the left humerus and the ribs was a netting needle of antler, too badly decayed for complete restoration. On the upper part of the right side of the thorax lay a sizer of granite (Plate X, *D*).

Burial No. 116, adolescent, closely flexed to the right. Under the skeleton but not on the other parts of the bottom of this grave, was a layer of powdered hematite, having a maximum thickness of about .5 inch. Back of the skull, together, were two of the well-known curved shell strips.

Burial No. 122, particularly described elsewhere. Across the upper part of the right thigh were shell beads, including a large one of jet.

Burial No. 124, closely flexed to the right. On the ribs of the right side of the thorax lay a netting needle of antler (Fig. 10, *C*). A handsome sizer of the same material (Plate IX, *G*) rested on the left elbow.

Burial No. 126. This skeleton lay on the back to the knees, the legs closely flexed to the outer side of the thighs. A knife or arrowhead, of flint, was at the right knee.

Burial No. 129, closely flexed to the left. At the neck were three large, tubular beads of shell and one of jet. One of the shell beads, having split when in use, had been fastened with asphalt.

Burial No. 134, closely flexed to the right. Red pigment (hematite) was on the upper part of the right humerus. At the lower part of the right side of the thorax lay a flint knife 4.5 inches in length. An arrowhead or knife, of the same material, 2.75 inches long, was on the lower part of the thorax. Halfway down the right thigh was a blunt, celt-shaped implement of quartzite, lying near the knife, owing to the flexion of the skeleton. A mass of gray clay was near the pelvis.

Burial No. 136, partly flexed to the left. At the left of the skull was a knife or arrowhead, of flint.

Burial No. 139, closely flexed to the left. Around the neck were beads of shell and one of jet.

Burial No. 142, closely flexed to the left. The skeleton lay at the bottom of a grave 6 feet 7 inches from the surface, the midden deposit there being 4.5 feet thick, so that the grave-pit extended about 2 feet into the yellow sand. Near the skull burial of this and having one leg under the cranium, was the skeleton of a dog, its skull immediately against the human cranium.

Burial No. 145, a child having shell beads around the neck, including two of jet.

Burial No. 148, closely flexed to the left, lay in a deep grave and had a bone piercing implement under the left leg, which must have been intentionally placed, as the skeleton lay far from the midden refuse.

Burial No. 150, a child about 3 years of age, having beside it the skeleton of a dog.

Burial No. 152, closely flexed to the right, more than 6 feet from the surface. On the upper part of the chest lay a knife or lancehead, of flint.

Burial No. 153, a child, lay immediately under Burial No. 152, but in reverse position, the head of the child being under the pelvis of the adult. Around the child's neck were beads of shell (*Anculosa prærosa* and one *Campeloma* of undetermined species) accompanied with a bead of claystone.

Burial No. 154, an infant. At the neck were four discoidal beads of shell.

Burial No. 155, closely flexed on the right. On the upper part of the chest, was an arrowhead or knife, of flint.

Burial No. 157, closely flexed to the right. Five discoidal, shell beads were at the neck.

Burial No. 159, a child. Around the neck and extending down on the chest were shell beads and nineteen beads of claystone, none especially large.

Burial No. 160, described in our special forms of burial. Shell beads and two beads of claystone were around the neck and around the left wrist and on the pelvis. The beads were as follows: the marine univalve *Marginella apicina*, the fresh-water univalve *Anculosa* of undetermined species, with many discoidal beads of medium size and some fairly large. With them were also two perforated fragments of shell, one being of a large marine univalve, and two shell tops of heads of hairpins. These, as shown in Fig. 16, had been made by placing the end of a pin in a lump of material, probably asphalt, and the section of shell on top. The shanks of the ornaments were missing, probably through decay.

FIG. 16.—Head of hairpin. With Burial No. 160. "The Indian Knoll." (Full size.)

Burial No. 161, already described as to the form of burial. Under the pelvis were two small, undecorated shell ornaments, each having two perforations at one end. With these were shell beads of the ordinary kind and of the two varieties of *Anculosa* found in this site, also a bead of bone, all probably having been on the front of some garment.

Near together, where the hands would be, the body being face-down as described, were a netting needle of antler (Fig. 13, *E*) and a sizer of banded claystone (Plate X, *B*). Asphalt remained in the perforation of this sizer. Under the right foot was an arrowpoint.

Burial No. 163, partly flexed to the right. At the outer side of the lower part of the right humerus was a sizer of chalcedony (Plate X, *C*), a beautiful object. On the opposite side of the arm, an inch or two distant from the sizer, lay the usual netting needle of antler, considerably crushed but since restored (Fig. 12, *G*). Near the elbow were two discoidal, shell beads which may have been attached to one end of the sizer in an ornamental capacity. In the case of Burial No. 263, this site, we shall see how beads were used as ornaments in conjunction with asphalt. At the neck of the skeleton were a few shell beads.

Burial No. 164, whose form has already been described. Near the left of the pelvis were three bone pins. In the vicinity of the right elbow were masses of red clay and of gray clay, near these being a rattle made from the shell of a tortoise, containing pebbles, and a large bead of jet, also a bit of flint.

Burial No. 165, an infant. On the bottom of the pit in which the skeleton lay was hematite pigment covering a space somewhat larger than that occupied by the bones.

Burial No. 166, partly flexed on the left, lay in a pit above Burial No. 167, the burial under description being nearly 7 feet from the surface. One of its lumbar vertebræ is transfixed by a spearhead of antler, our first experience in discovering a point of any kind embedded in human bone.

Dr. M. G. Miller, who, while carefully removing each bone of this skeleton for transmittal to the National Museum, the present writer being at hand, came upon the transfixed vertebra, kindly has prepared a note on this subject to follow the close of our account of our work at "The Indian Knoll."

Burial No. 167. The form of this burial has been already described. At the base of the skull was a celt-shaped, blunt implement without the perforation at one end that some of these tools possess, though none of the perforated kind was found in the Knoll. Also near the skull were two discs of shell, accompanying hemispheres of asphalt,[1] the upper parts of ornamental hairpins of the kind shown in connection with Burial No. 160.

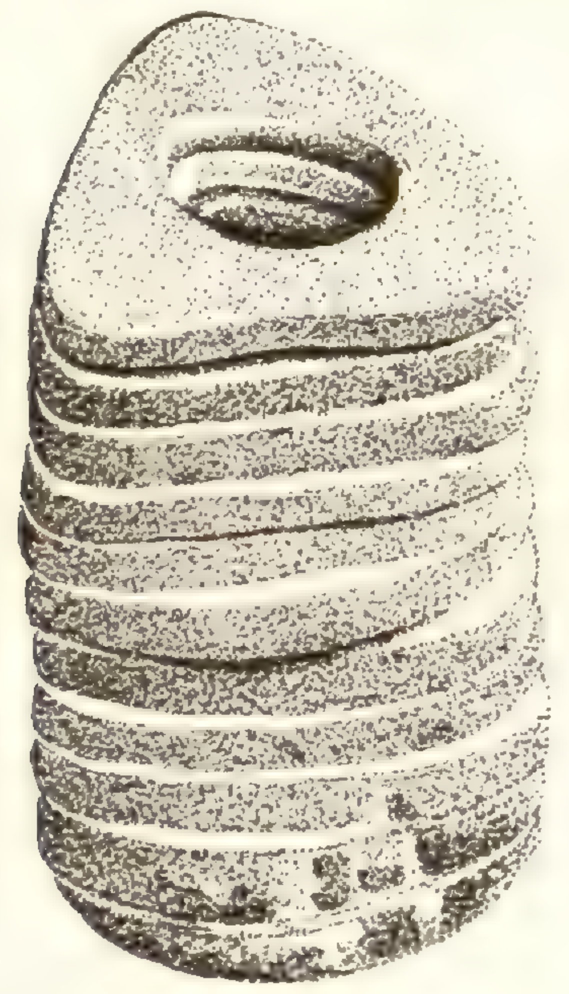

Fig. 17.—Objects of shell, shown as found. With Burial No. 170. "The Indian Knoll." (Full size.)

Under this burial in part and partly under that of a child lying nearby, was the skeleton of a dog.

Burial No. 169, closely flexed to the left, had an arrowhead or knife near the skull.

Burial No. 170, already described as to form. Extending along the right side of the lower part of the thorax, placed face to face closely, resembling a solid mass, were eleven heart-shaped beads of shell arranged to present a uniform outline as shown in Fig. 17. If these beads had been fastened together, presumably gum had been employed, as no trace of asphalt remained.

Burial No. 171, already described as to form, had, at the right elbow, a lance-point of flint, 4.25 inches in length.

Burial No. 173, the skeleton of an infant at the bottom of a circular pit 20 inches in diameter, extending into the sand. The bottom of the grave had been covered

[1] Doctor Keller writes of this substance found with Burial No. 167 as "a brittle material which on grinding yields a light brown powder. It also contains nearly 30 per cent. of asphaltum and yields an ash of highly silicious substance which also contains some phosphate of lime, but much less than the preceding specimen."

Reference is made by Doctor Keller to the asphalt found with Burial No. 84, referred to by us in the Introduction. Doctor Keller made a number of tests of the asphalt from this site, not all of which are given in detail by us.

with a thin deposit of hematite, pink in shade. At the face was a tube of bone 6.7 inches in length and .8 inch in maximum diameter, highly polished, like all similar tubes in this mound, as already stated.

Burial No. 172 lay closely flexed to the left at the bottom of a grave 7 feet 8 inches deep, extending 3 feet 2 inches into the sand. The skull and skeleton were saved.

The skulls and other bones given by us to the United States National Museum were shipped from the field without thorough cleaning. After their arrival at destination we were gratified to receive from Dr. Aleš Hrdlička the following communication: "In cleaning skull No. 290,056, a young female from 'The Indian Knoll,' we found a ragged hole in the right temple and a crude, large, flint arrowhead within the skull cavity," in reference to Burial No. 172.

The outline of the broken part is clearly notched by the edge of the arrowpoint on entrance. On the opposite side of the skull, in line, is a broken space in thin bone, the margin of part of which is recent. It is possible that the skull at this place may have been fractured by the impact of the arrow within and parts may have broken away then and parts afterward.

One hardly looks for the fate indicated by the presence of this arrowhead to have befallen a young woman even in savage times. Doubtless some story of murder or of massacre lies behind this episode.

FIG. 17*a*.—Arrowhead of flint, found within the skull cavity of Burial No. 172. Both sides are shown. (Full size.)

The arrowhead of flint, found within the skull cavity, about 2 inches in present length, has lost part of the point and seemingly some of the shank, both presumably through force of impact.

An interesting fact in connection with this arrowpoint, which was used to such effect, is its crudity, apart from its mutilation; if found by us under any other circumstances, it would have been considered unfinished or a "waster." This

arrowhead, which demonstrates the result of how rude an effort sometimes saw actual use, is shown in Fig. 17*a*, both sides being represented.

Burial No. 174, closely flexed on the left. Near the skull was an arrowhead of antler.

Burial No. 179, adolescent, closely flexed to the right. A few shell beads encircled the right forearm.

Burial No. 185, the skeleton of a child, slightly disturbed. Against the lower jaw was a small ornament of sheet-copper, somewhat broken.

Burial No. 186, an infant with which was a mass of the red oxide pigment, about the size of a woman's fist.

Burial No. 189, a young child. At the neck were four beads of shell and at the pelvis a tube of bone slightly smaller than the one described in connection with Burial No. 173.

Burial No. 192, adolescent, closely flexed to the right. At the back of the skull lay a muller which, as this burial lay 6.5 feet from the surface in the underlying yellow sand, presumably had been intentionally interred with the burial.

Burial No. 196, a young infant lying at the bottom of a grave, 7 feet from the surface and extending nearly 3 feet into the sand. The bones were wonderfully preserved for those of one so young. The bottom of the small grave-pit, about 21 inches in diameter, was covered with red hematite pigment.

Burial No. 201, an infant. At the neck and on the thorax were discoidal shell beads and others made from the river shell *Anculosa prærosa.* With the beads was a small ellipse of shell with a large central opening, also a strip of shell about one inch in length, pointed at one end and having a perforation at the other.

Burial No. 202, closely flexed on the left, the upper arms along the chest, the forearms partly flexed and almost in contact with the knees, which were about one foot from the forehead. Near the right knee and the right hand was a sizer of quartz (Plate XI, *H*), having its needle of antler (Fig. 12, *E*) only 2 inches away.

At the right hand were a sizer of antler (Fig. 9, *J*) and its needle of the same material (Fig. 12, *D*).

At the right shoulder was a grooved axe of limestone, the poll at the shoulder, the blade down the side of the burial. This skeleton lay 5 feet 6 inches deep, 1.5 foot in the yellow sand, so that the axe evidently had been intentionally placed and was not an accidental apposition.

Burial No. 204, described elsewhere as to position. At the pelvis lay a flint knife or arrowhead.

Burial No. 206, adolescent, partly flexed to the right. Around the neck were a few small, discoidal, shell beads and three larger ones of shell with a barrel-shaped bead of jet.

Burial No. 208, a child. Placed side by side were two parts of a pestle of limestone which had been 13 inches in length, lying beside the skull.

Burial No. 209, a child. Shell beads and one of jet were at the neck.

Burial No. 210, closely flexed on the back, at the bottom of a grave, 8 feet 5 inches from the surface, extending 2 feet 2 inches into the sand. Around the neck were shell beads and a tubular one of claystone. Alongside the skull, in fragments, was a large drinking-cup made from the marine shell *Busycon perversum*.

Burial No. 211, adolescent, closely flexed on the left. On the upper part of the right side of the thorax were twenty-three discoidal beads of shell, each about .7 inch in diameter, and a fine bead of jet.

On the lower part of the thorax was a sizer of limestone (Plate XI, *E*) and its netting needle of antler, somewhat decayed.

Burial No. 212, closely flexed on the right. Shell beads and one of jet lay across the upper part of the thorax.

Burial No. 216, a child, flexed closely on the right, having around the neck and extending down on the thorax a few discoidal shell beads and many made from the two species of *Anculosa*, often encountered at this site. Among these were: a barrel-shaped bead of claystone one inch in length; two perforated canine teeth of the bob-cat (*Lynx rufus*); and one of the curved shell strips having perforations, found at this site.

On the lower part of the thorax, together, were a sizer of silicious material resembling jade (Plate X, *G*) and its needle of antler (Fig. 12, *C*).

Burial No. 218, an infant. At the neck were shell beads and a barrel-shaped one of claystone.

Burial No. 219, a child. At the pelvis was a small sizer of antler (Fig. 9, *D*) and its needle, the latter somewhat decayed and having part missing from a break in early times.

Near the sizer was a bead of antler 1.2 inch in length and an arrowhead or knife of flint, another being at the right femur. A bone pin in fragments lay near the pelvis.

Burial No. 222, partly flexed to the right. Fifteen shell beads were around the neck, and a fine barrel-shaped one of jet.

Burial No. 226, closely flexed to the right. At the upper part of the left humerus was a bone awl; a flint scraper lay over the right elbow.

Burial No. 229, adolescent, closely flexed on the left. On the thorax were a few shell beads. Between the knees and thorax was the carapace of a tortoise, having two holes at one end for suspension—doubtless part of a rattle.

Burial No. 230, an infant, having five tubular shell beads at the neck, each from 1 inch to 1.6 inch in length, and a large tubular bead of jet. Near the beads were four gorgets of shell, bearing a rude decoration common to all, shown in Fig. 18.

Burial No. 231. Parts of a skeleton interred on the back, the central portion missing. Around the neck were shell beads and a tubular bead of claystone. Near the right femur was an arrowhead of flint, while another arrowhead and a bone pin, together, were nearby.

Burial No. 233, partly flexed to the right. Around the neck and above the shoulder, as if the string had swung out from the neck, were beads of shell and

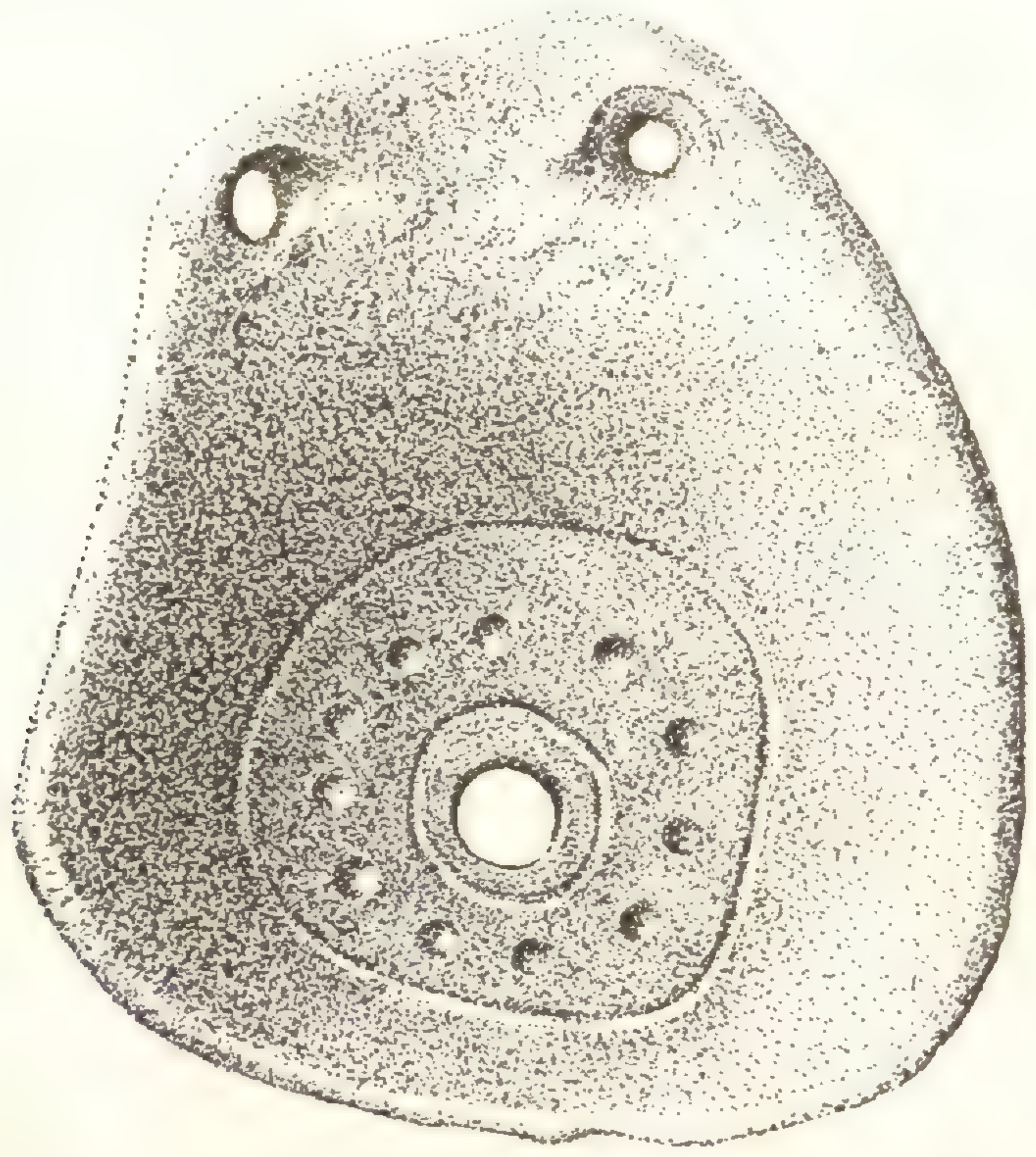

Fig. 18.—Gorget of shell. With Burial No. 230. "The Indian Knoll." (Full size.)

one of claystone. Other beads were on the upper part of the thorax. A bone awl and a netting needle of antler (Fig. 13, *G*) were at the left of the pelvis, but no sizer was found. With this burial was also an incisor of a beaver (*Castor canadensis*).

Burials Nos. 235 and 236, children, one lying face-down to the knees, the legs flexed vertically above the level of the thighs and over them. Immediately under this burial was that of another child, partly flexed to the right, the pelvis below that of the upper one, though the trunks were not in the same line, the head of the deeper burial being to one side.

Just back of the pelvis of Burial No. 236 was a netting needle of antler (Fig. 12, *B*) and most of a sizer of gabbro (Plate XI, *I*).

The breaking of this sizer we believe to have been ceremonial, as the needle was intact and the bones of the skeleton were undisturbed. There was every evidence that a double burial had been made at one time. The two principal parts of the sizer were lying together, though the position of one part was reversed in reference to the other, that is, its outer, or unbroken margin was toward the broken part of the other. Moreover, small parts of the sizer lay near the skull and one in front of the thorax. Though this burial was entirely removed with the aid of a trowel and all the material taken out was passed through a sieve, some minor parts of the sizer were not recovered, and these, presumably, were left behind at the scene of the ceremonial breaking.

In front of the skull were two discs of shell fitting to hemispheres of asphalt, each having a hole in the lower part where the end of a pin had been. These,

when entire, had been pins used as ornaments in the hair, like others in this place. Shell beads were at the pelvis and in front of the trunk below the thorax, having with them eleven shell strips of various shapes and sizes, each with a perforation at one end but without decoration.

With the beads also were eight tubular beads of red claystone, the longest 1.6 inch in length, and a fine bead of the same material, oblate spheroidal, shown in Plate XII. These beads and ornaments may have formed a girdle around the waist. Under the pelvis was a drill of flint.

Burial No. 237, a child, having shell beads, a large one of jet and four smaller ones of claystone.

Burial No. 240, partly flexed to the left. At the right wrist were a few shell beads and a small, undecorated, shell pendant.

The condition of the skull of this individual showed him to have been born under an evil star. A blow from a club, the poll of an axe, or some other blunt weapon had fractured the skull on the left side, which he had survived, as shown by the condition of the fracture.

On the other side of the skull are marks of four wounds: a circular opening evidently left by the end of an antler point; another opening where seemingly two antler points have entered near together, and a third perforation caused either by a glancing blow from an arrow, a thrust of a spear coming obliquely, or from the edge of an axe. From these wounds the victim did not recover, as there is no sign of repair on the margins.

Dr. M. G. Miller has kindly prepared the following note in reference to these wounds:

"Starting from a point on the left parietal bone, two inches below the sagittal suture and the same distance back of the coronal, a wide line of fracture extends downward and forward to the upper end of the temporo-sphenoidal suture and continues down this suture almost to the base of the skull. From the upper end of this fracture another line, less open but clearly defined, extends downward and backward to the temporo-parietal suture which it intersects about 1.5 inch back of the main fracture. Connecting these about 1.5 inch below their point of union is a third line antero-posterior in direction.

"Throughout most of its course the principal line of fracture is superficially wide, the separation of the margins of the outer plate of the skull measuring over .1 inch in places. The edges are rounded and somewhat irregular, evidently the result of a suppurative process. Along the middle part of its course, for about .75 inch, the fissure extends through the inner plate also, presenting here a free opening into the cranial cavity. Restoration of bone tissue, however, is evident along the upper part, where there is some thickening of the outer plate.

"The shorter line of fracture, clearly defined, is solidly united throughout its course, while the connecting fracture is merely a trace.

"The part of the parietal lying in the angle formed by the two principal lines of fracture is somewhat depressed, especially at the apex, where considerable

thickening of the outer plate is evident. Moderate exostosis is present also just above this part of the fracture.

"The inner surface of the parietal shows a low, sub-conical projection of bone beneath the apex of the depressed portion.

"Notwithstanding the extent and severity of this lesion, it is evident the victim survived the injury for a considerable period.

"A little below the center of the right parietal is a circular perforation .25 inch in diameter, while on a level with the right zygomatic arch (which is lacking) is a double perforation formed by the intersection of two openings, each similar to the one just mentioned. These wounds are cleanly cut externally but show considerable shattering of the inner table, and probably were caused by antler points.

"In the right side of the frontal bone, close to the coronal suture, is an elongated, perforating wound with depression and splintering of the inner table.

"The wounds of the right side of the skull show no evidence of repair and evidently resulted in the speedy death of the subject."

Burial No. 241, a disturbance, had a bone pin near the skull, possibly an accidental deposit.

Burials Nos. 242 and 243, the former partly flexed to the left, the other in the same position but to the right, lay in a grave-pit facing each other, the knees interlocking. Near the skull of Burial No. 243 was a large fragment of antler, and an arrowhead or knife, of flint. Also near the skull but away from the other deposit were a bone awl and the jaw of a woodchuck (*Marmota monax*).

Burial No. 244, infant. At the neck and on the chest were shell beads, with which was a long tubular bead. At the head was a tube of bone, while another lay at the feet. These tubes, as stated in the introduction, are highly polished, each about 4.5 inches in length, and with three others found singly were with infants or young children. Near the pelvis were two hemispheres of asphalt in poor condition, with remains of discs of shell, heads for hairpins, doubtless a gift from someone possessing hair enough to have used them.

This little skeleton lay in a circular grave about 20 inches in diameter, extending 3.5 feet into the yellow sand. Two feet above the bones, in the same grave, was the skeleton of a dog.

Burial No. 246, a disturbance. On the tibia lay a pin of bone.

Burial No. 251, closely flexed to the right. At the neck and across both shoulders were shell beads.

On the middle of the thorax were scattered fragments of a winged stone of quartz (Plate XI, *B*), all of which was not found, though prolonged and conscientious sifting was done. Presumably, as in the other cases, this object had been ceremonially broken elsewhere. With the scattered fragments of stone was the butt of a netting needle, perhaps broken at the same time.

Burial No. 252, child, having shell beads and a bead of claystone at the neck.

Burial No. 253, adolescent, closely flexed on the back. At the neck were seven discoidal beads of shell, each about one inch in diameter.

Burial No. 254, a child. At the neck were shell beads.

Burial No. 255, closely flexed on the right. At the outer side of the right elbow was a rattle made from the shell of a box-tortoise, having in place pebbles much larger than were usually employed by the aborigines for this purpose.

Burial No. 256, closely flexed on the left. A portion of a lance or dagger, of flint, 3.3 inches in length, rested on the lower part of the chest.

Burial No. 258, closely flexed to the right. Above and around this skeleton and also Burials Nos. 266 and 267, were mingled bones, including three calvaria.

Burial No. 259, closely flexed on the left. This skeleton lay at the bottom of a pit extending into the yellow soil, the bottom of which was covered with a thin layer of charcoal immediately beneath the burial but not beyond it.

At the left knee was part of a sizer of gneiss (Plate X, *F*) and its needle of antler (Fig. 10, *D*). Protracted sifting failed to find the remainder of this sizer and presumably we have here another case of ceremonial breaking.

Burials Nos. 260 and 261. A skeleton closely flexed on the right had delicate bones and a skull resembling that of a woman. On the right arm, the face against the breast of Burial No. 260, was Burial No. 261, an infant.

Burial No. 262, closely flexed to the left. At the left side of the skull was a deposit of pointed implements of bone, and three claws of a raptorial bird.

Burial No. 263, partly flexed to the right. Encircling the pelvis, and probably on the belt, at one time, were beads made from the fresh-water univalve *Anculosa prærosa*. At the right side of the pelvis were two complete hairpins of bone, having heads made of asphalt and shell beads, shown in Plate XII. "A new use for beads," said Mr. Willoughby, on seeing them.

Burial No. 264, adolescent, closely flexed to the right. Shell beads and one small bead of claystone were at the left wrist.

Burial No. 265, closely flexed to the left, but without a skull. This burial lay under Burial No. 258, and near Burials Nos. 266 and 267, near which were disconnected bones, and while it is possible the individual may have lost his head in battle, it is more likely it fell off before burial and probably was present among the crania lying near these skeletons.

Burial No. 269, partly flexed to the right, also lacked the cranium, but here the cause was apparent, as a deeper grave (Burial No. 270) had intersected the one under description to the extent of the removal of the skull. Near where the cranium of Burial No. 269 had been, lay a flint knife.

Burial No. 272, closely flexed to the right. At the outer side of the right elbow, with a mass of asphalt[1] was a sizer of antler (Fig. 9, *A*). Back of the left shoulder was another sizer of antler (Fig. 9, *F*) and its netting needle (Fig.

[1] Doctor Keller writes: "The specimen marked 'Asphalt, Indian Knoll, Burial 272' contains less than 60 per cent. of mineral matter, and about 40 per cent. of asphaltum which is easily extracted with carbon bisulphide. The ash contains silica, alumina, lime, phosphoric acid, and traces of oxide of iron."

10, *F*), also a lancehead or knife more than 4 inches long, somewhat broken. Above the left shoulder was a smaller lancehead or knife. Across the thorax and lower, near the pelvis, were respectively, two bones of a dog.

Burial No. 273, infant, having at the neck some discoidal shell beads, others made of *Anculosa prærosa,* one bead of claystone .5 inch in diameter, five small fragments of marine shell, each with a perforation for suspension, a small fossil having a natural perforation, perhaps used as a bead, and two canine teeth of a bob-cat (*Lynx rufus*), each having a perforation in the proximal end.

Burial No. 280, closely flexed on the right. Shell beads were at the neck. Fragments of a large marine univalve, which possibly had been a cup, were at the lower part of the thorax.

Burial No. 281, closely flexed to the right. Shell beads made from an unknown species of *Anculosa,* and a large bead of jet were at the lower part of the right humerus. A quantity of red hematite pigment extended along the right upper arm. In the angle between the knees and the body was a rattle made from the shell of a box-tortoise, in fragments, as were nearly all found here. Under the left knee was a lancehead 4 inches in length.

Burial No. 283, a child. On the thorax, as though it had been suspended from the neck, was a molar of a wolf, perforated for suspension through each of the two roots and having, in addition, auxiliary grooves running longitudinally along the sides of each root.

Burial No. 287, partly flexed to the right. Transversely under the pelvis lay the skeleton of a dog, the head projecting on one side, the hind-quarters on the other. Near the right elbow was the shell of a tortoise containing pebbles, badly crushed.

Burial No. 290, infant, having shell beads at the neck, among which were two curved strips of shell of the kind already described as found at this place.

Burial No. 291, a child, had shell beads at the neck.

Burial No. 295, infant. At the neck were shell beads and a tubular bead of claystone.

Burial No. 296, already described as to form of burial. A lancehead 4 inches long, without a point, lay under the trunk. Another about one inch shorter was against vertebræ of the thorax. Near the skull was a netting needle in fragments, which has since been restored (Fig. 10, *A*), probably a ceremonial breaking which may have included the sizer, though none was found with the burial, which was carefully removed with a trowel.

On that side of the Knoll toward the river, where there had been some wash, we were informed Mr. W. F. Cundiff, son-in-law of Mr. Brown, the owner of the Knoll, had picked up an object which proved to be a beautiful, winged stone of flint, of exquisite shades and symmetry. This we obtained from Mr. Cundiff and illustrate on Plate XII.

We purchased from a resident of Paradise, which is opposite the Knoll as we have stated, an object apparently of claystone, having a deep, rounded

ORNAMENTAL HAIR-PINS; BEAD OF CLAYSTONE; SHELL ORNAMENTS; BEADS OF JET; WINGED STONE OF FLINT. "THE INDIAN KNOLL." (FULL SIZE.)

notch at one end, at the bottom of which are two diagonal grooves, as shown in the detail accompanying the illustration (Fig. 19). Mr. Willoughby says he found this object to serve admirably as an arrowshaft wrench and that it may have been so used.

Fig. 19.—Arrow-shaft wrench. "The Indian Knoll." (Full size.)

Mr. E. K. Williams, living about two miles from Paradise, Ky., possesses a bi-cave stone of silicious material, 4.75 inches in diameter and 2.8 inches across each of the hollowed portions. This stone, which is not entirely symmetrical, was, according to Mr. Williams's statement, found by his father on the property now occupied by the son. The stone was kindly submitted to us for examination.

"The Indian Knoll," though larger, in composition resembles a number of dwelling-sites farther up Green river, where shells are largely mixed with the dark soil. These sites are, in order going up: the Newton Brown Place, at Green River P. O., Ohio County; the Austin Place,[1] Butler County; the Rhone Place and the Deweese Place, Butler County.

These dwelling-sites, however, all investigated by us to some extent (except the Austin place, where the presence of numerous buildings stood in the way), so far as ascertained had much more solid and deeper deposits of shell than is that at the Indian Knoll. A well at the Deweese Place was dug through 12 feet of shell, it is said. At none of the places mentioned was soil beneath the shell reached by us. The burials found in our digging were widely scattered and had no artifacts accompanying them.

Human Vertebra Transfixed by a Spearpoint of Antler.

By M. G. Miller, M.D.

The vertebra penetrated by an antler spearhead (from "The Indian Knoll," Ohio Co., Ky.) is the second of the lumbar series. The point entered the left intervertebral foramen between the first and second lumbar vertebræ, passed

[1] The reader will recall that a place of the same name below "The Indian Knoll" has been described in this report.

downward and across the spinal canal and pierced the right pedicle, the tip of the spearhead projecting an inch beyond the pedicle (Fig. 20). It is still firmly embedded in the bone.

FIG. 20.—Human vertebra transfixed by a spearpoint of antler. "The Indian Knoll." (Full size.)

The right pedicle is completely separated from the body of the vertebra, while on the left side a fracture extends from the upper surface of the body downward through about three-quarters of the base of the corresponding pedicle.

The lower, posterior margin of the body of the first lumbar vertebra also is somewhat crushed by the pressure of the spearhead.

Death must have occurred soon after the wound was inflicted, as the bone presents no indication of repair.

The spearhead evidently was thrust into the side at a little distance from the spinal column and probably was covered by flesh when it penetrated the vertebra. Removal of the shaft then left the point concealed and beyond the reach of one who might wish to extract it.

The antler spearhead, unbroken and well-preserved, has a length of 3.9 inches and measures .8 inch across the base, which is unbarbed. The socket for the shaft has a depth of one inch and is .5 inch in diameter of opening. The surface presents longitudinal markings or facets, apparently made by a paring or scraping tool, while the apex has been rather abruptly pointed. The spearhead has been in no wise impaired by its passage through the bone, a fair indication of the effectiveness of points made of such material.

Though antler points are found from Maine to Arkansas,[1] human bones retaining them have been rather infrequently met.

[1] C. C. Willoughby, "Antler-pointed Arrows of the Southeastern Indians," *American Anthropologist,* N. S., vol. III, p. 431.

In Peabody Museum, Cambridge, is a human vertebra transfixed with an antler arrowpoint, from Turpin's Farm, near Madisonville, Ohio.[1] In this instance the point entered from the back, the tip of the arrowhead being embedded in the body of the vertebra.

In the investigation of Burial Ridge, at Tottenville, Staten Island, Mr. George H. Pepper came upon three associated skeletons, among the bones of which were numerous arrowheads of antler, bone, and stone. One antler point was found engaged in a rib.[2]

Mr. A. C. Parker, curator of the New York State Museum, in a letter mentions a skull found near the shore of Lake Champlain, opposite the village of Dresden, in which a long antler point had penetrated an eye-socket.

In a communication from Dr. C. L. Metz reference is made to finding a human sacrum pierced by an arrow- or lancehead of deer antler, in the aboriginal cemetery near Madisonville, Ohio. The point, about 2.5 inches in length, evidently had traversed the abdominal cavity and penetrated the sacrum, the tip projecting beyond the posterior surface of the bone.

The skull of Burial No. 240, "The Indian Knoll," as stated in the description of the remains, presents rounded perforations evidently made by antler points, but these presumably had been extracted before burial.

Instances of human bones transfixed by points made from other materials are more numerous.

The skull of Burial No. 172, "The Indian Knoll," as stated in the description of the burials from this site, presents an irregular opening about one inch in diameter in the anterior part of the right temporal bone. The margins indicate that the injury was caused by a force applied from without, while the lower edge shows a distinct notch. In the cranial cavity was found a flint arrowhead so rude in character that ordinarily it would be classed as a reject.

At Peabody Museum are:[3] a skull from the aboriginal cemetery near Madisonville, Ohio, bearing the point of a flint arrowhead in the occipital part; a vertebra from Tennessee with a fragment of a flint arrowpoint embedded in it.

Mr. Parker refers to small, triangular, flint arrowpoints in a vertebra of an Indian skeleton found at Ripley, N. Y.

Dr. Harlan I. Smith,[4] in his exploration of an aboriginal site in Mason County, Ky., found embedded in an os calcis part of a slender arrowhead of flint. Two lumbar vertebræ from another burial at this place show wounds caused by a similar point.

George G. Heye, Esq., of the Museum of the American Indian, Heye Foundation, New York, writes: "We have two or more skulls and a few bones con-

[1] Letter from Mr. C. C. Willoughby.

[2] Alanson Skinner, "The Indians of Manhattan Island and Vicinity," *The American Museum Journal*, vol. IX, No. 6, p. 149.

[3] Mr. C. C. Willoughby in letter.

[4] "The Prehistoric Ethnology of a Kentucky Site," Anthropological Papers of the American Museum of Natural History, vol. VI, Part II, p. 226.

taining points, all of which are of stone. The specimens are now packed away in a storage warehouse where they will remain until the new building is finished . . . ."

Wilson describes[1] from the collection of the National Museum: a skull from an aboriginal cemetery in Henderson County, Ill., which bears in the left squamosa a stone point of the drill type; a pelvic bone pierced by a flint point, and the head of a femur, possibly human, with a flint point engaged in it, both from a cave near Bowling Green, Ky.

The Army Medical Museum possesses a number of specimens.[2] A skull of a California Indian has a long, flint arrowhead embedded in the left orbit. Another from an Indian burial place in the same State has two stone points, one obsidian, the other porphyritic, in the right parietal bone. A lumbar vertebra penetrated by a small arrowpoint of white quartz is from an Indian mound in Dakota. In addition the Museum has several instances of human bones bearing arrowheads of iron.

The Museum of the Ohio State Archæological and Historical Society has: an os innominatum pierced by an arrowhead of flint; a similar bone with an arrow- or spearhead of flint thrust into the joint cavity; a skull from a grave in Miami County, Ohio, with a flint point embedded in it; and a skull pierced with a bone arrow.[3]

Dr. C. L. Metz, referring to human bones bearing arrow- or lanceheads, found in the aboriginal cemetery at Madisonville, mentions: a skull with a part of a flint arrowhead in the occipital bone (evidently the one now in Peabody Museum); the first and second lumbar vertebræ of a skeleton, penetrated by a triangular flint point; a rib transfixed by a similar point.

In the Museum of Anthropology, University of California, is a femur with a piece of an obsidian arrowhead embedded in the greater trochanter, from a shell-mound at Ellis Landing, Contra Costa County, Cal.[4]

Mounds on the Annis Place, Butler County.

On the property of Mr. W. T. Annis, who resides upon it, is the largest mound seen or heard of by us on Green river. This mound, of sandy loam, approximately square with corners rounded by time, has a flat summit-plateau, is 11 feet in height and about 110 feet in diameter of base. It stands immediately on the river bank.

A central hole, 12 feet square, reached a well-defined dark line in the soil at a depth of 6 feet 10 inches, on which was a fireplace—no doubt marking a period of occupancy. Twelve feet down the excavation came upon a distinct base of dark soil resting on undisturbed, yellow sand throughout, no grave

[1] Thomas Wilson, "Arrow Wounds," *American Anthropologist*, N. S., vol. III, p. 513 *et seq.*

[2] Summary kindly furnished by Lieut. Col. C. C. McCulloch, curator of the Army Medical Museum. Interesting descriptions of most of these specimens are given in Wilson's paper.

[3] William C. Mills, M.Sc., curator, in letter.

[4] Dr. E. W. Gifford, in letter.

extending below. No trace of former burials was apparent in the mound, which doubtless had been domiciliary.

About 80 yards directly back of the larger mound, in a field that has been under cultivation, is a mound of sandy loam, 2 feet 8 inches in height and about 60 feet in diameter of base. The mound evidently has been plowed over and considerably reduced in height. A number of trial-holes carried to the base, in one instance came upon remains of a skull much decayed, and traces of other bones.

Mound on the Martin Place, Butler County.

On the extremity of a ridge is a mound overlooking the river, on property belonging to Mr. J. W. Martin, who lives somewhat farther inland.

This mound, quadrilateral and having a top originally flat, has been much dug into for a long time and locally has a great reputation for containing human bones and "rocks," though there seems to be absolutely no history as to the discovery of artifacts. We were told of the removal from it of numerous slabs which had been used later in minor details of building.

The mound, 5 feet in height, had basal diameters of 115 feet and 90 feet, the summit-plateau being about 60 feet square. The mound probably was a residential one used later for interments, or possibly one constructed for burial purposes, as some low, flat mounds appear to have been.

Evidently burials had been very numerous in the mound, for when spaces were selected which showed no evidence of former digging, eight trial-holes all quickly came upon stone graves, one of which, however, in spite of our careful selection of spaces for investigation, proved to be a complete disturbance, while others had been interfered with to some extent.

It has been noted that the valley of the Cumberland river, in Tennessee, was the region where the regular stone box-grave was most frequently in use, and as one departs from that region variants in the form of the grave make their appearance. Details as to these variants are often so numerous and of such a character as to make exact description difficult, but when to this is added the fact that there has been disturbance among the graves, a clear recital of details is well nigh impossible. However, one can but do one's best.

Burials Nos. 1 and 2. Near the surface was what had the appearance of a pavement of small slabs evenly laid, but leaving inconsiderable spaces uncovered, as would of necessity be the case when undressed slabs were employed. This pavement, nearly quadrangular, was 5 feet 7 inches by 4 feet 3 inches in extent and was made of sandstone slabs, which variety of stone was the only one noticed by us in the mound.

At the southeastern corner of the pavement and incorporated with it, was a box-grave (Burial No. 1) containing the bones of a young child, much decayed. This grave, shown in diagram (Fig. 21, where relative positions are given, not all drawn exactly to scale) as having the covering slabs removed, had a neat flooring of slabs. The upper margins of the sides and ends, upright slabs, were

at the level of the pavement, the covering slabs of the grave being above the level and forming the only exception to the flat surface of the pavement. A part of the outer side of the grave continued beyond it, forming a portion of a kind of curb present on the eastern and northern sides of the pavement, but not found by us on the southern and western sides. The eastern curb, however, which seemed to have been slightly disturbed or irregularly made at the northern end, reached the level of the pavement only, while that on the northern side projected 6 or 8 inches above it.

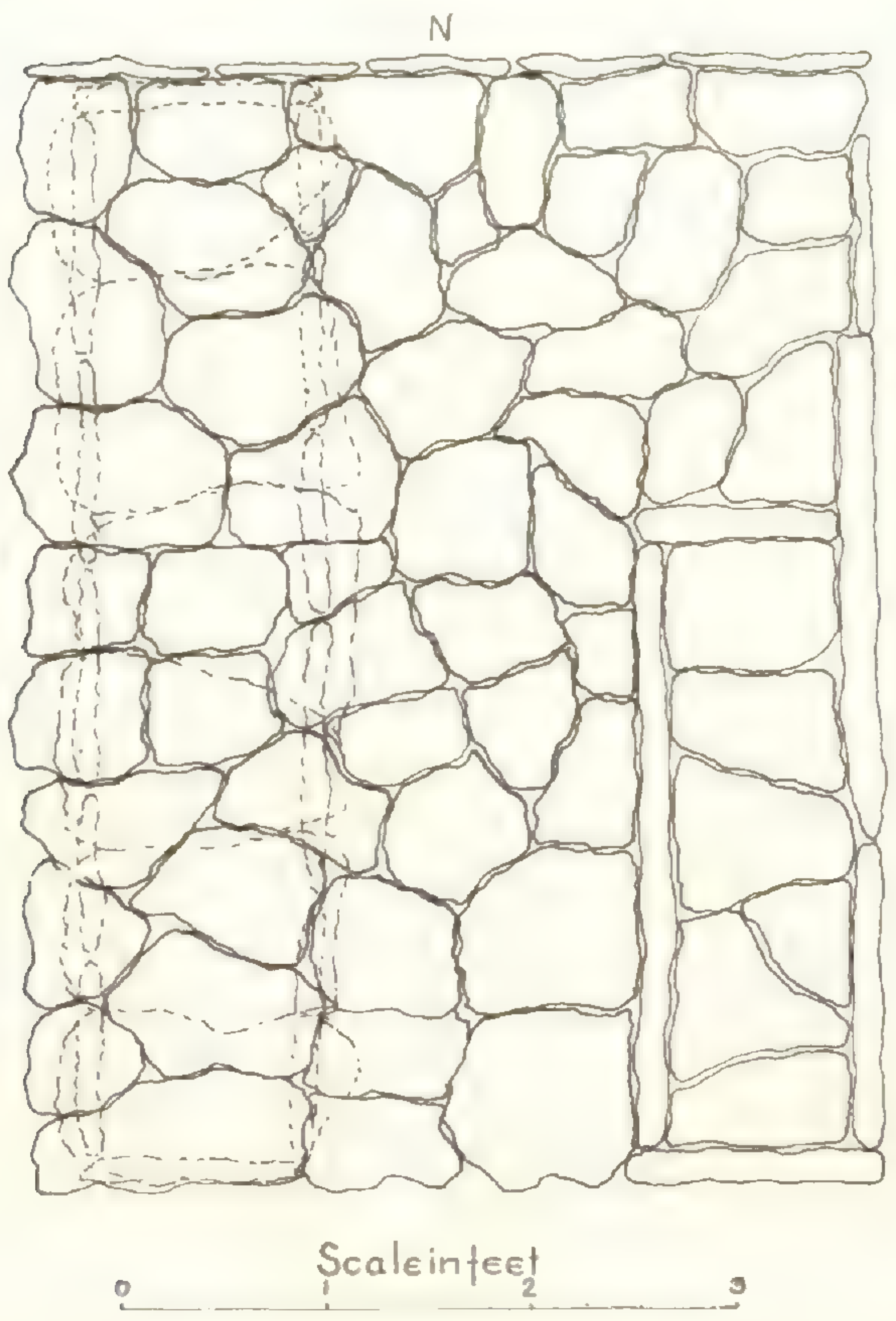

FIG. 21.—Burials Nos. 1 and 2. The Martin Place.

An interesting feature of the northern curb was that each upright slab rested on a rudely-oblong base apparently selected for the purpose, each slab seemingly having its own particular base, which in a rude way conformed to the lower ends of the upright slabs, which were roughly triangular, presenting a serrated appearance above the level of the pavement.

Extending below the western part of the pavement throughout its entire length was a box-grave (Burial No. 2) having sides, ends, flooring and top, of slabs, the top being about 6 inches below the pavement. No trace of bones remained in this grave.

Under no part of the pavement, except in the cases specified, were there burials or slabs.

This is the description of this interesting placement of slabs and its burials as found by us. It is well to bear in mind, however, in connection with it, that the placement was near the surface and in a mound where much digging had been done.

We think it not unlikely that the pavement may have been the resting-place of a skeleton, constituting a burial similar to one described by Fowke[1] as found in Ohio, and as encountered by us in eastern Tennessee,[2] though in the instances cited a curb surrounded the pavement, which possibly was the case here at one time.

Burials Nos. 3 and 4 (Fig. 22). Burial No. 3, a box-grave without flooring, having the sides diverging considerably, on which rested covering slabs whose size showed their extremities must have projected considerably beyond the sides of the grave before the outward deflection took place. The ends of the grave were upright. This grave, about 8 feet long and 4 feet wide, outside measurement, contained the skeleton of an adult, at full length on the back, very much decayed.

[1] Gerard Fowke, "Archæological History of Ohio," p. 402, Fig. 128.

[2] "Aboriginal Sites on Tennessee River," p. 406, JOURN. ACAD. NAT. SCI. PHILA., vol. XVI.

The head end of this grave abutted against a side of the foot end of the grave of Burial No. 4, a box-grave, 8.5 feet long by 3.5 feet wide, outside measurement, having no flooring. The sides and the ends were upright; the covering slabs did not project beyond them. The grave contained decaying remains of the skeleton of an adult extended on the back, the cranium represented only by the lower jaw, which rested on what had been the lower part of the chest.

FIG. 22.—Stone graves. The Martin Place. Burial No. 3 (to the reader's left) 8 feet long by 4 feet wide. Burial No. 4, 8.5 feet by 3.5 feet.

Two features of interest were noticed in connection with these graves. It seemed as if the makers of them had wished to confer a uniform appearance to them and had selected for grave No. 3 large covering slabs as an afterthought to project and to make the top of grave No. 3 about uniform in width with that of grave No. 4, which probably was the first to be built, the inside width of grave No. 4 being considerably greater than that of grave No. 3. If such was the design of the aborigines, they had succeeded, for when the soil was removed from above the graves they had the appearance of a single grave with an offset.

At the northeastern corner of grave No. 4, as shown in the diagram (Fig. 23), which is not drawn exactly to scale, was a small, triangular, compartment, not built within the grave proper but outside it, containing no bones and seemingly too small to have been used for burial purposes, though possibly the skeleton of a young infant may have been crowded into it.

It appeared to us that, in pursuance of the desire for symmetry to which we have referred, the aborigines had built this addition in order to bring out the end of the grave, which tapered somewhat, to the diameter of the remainder of the grave.

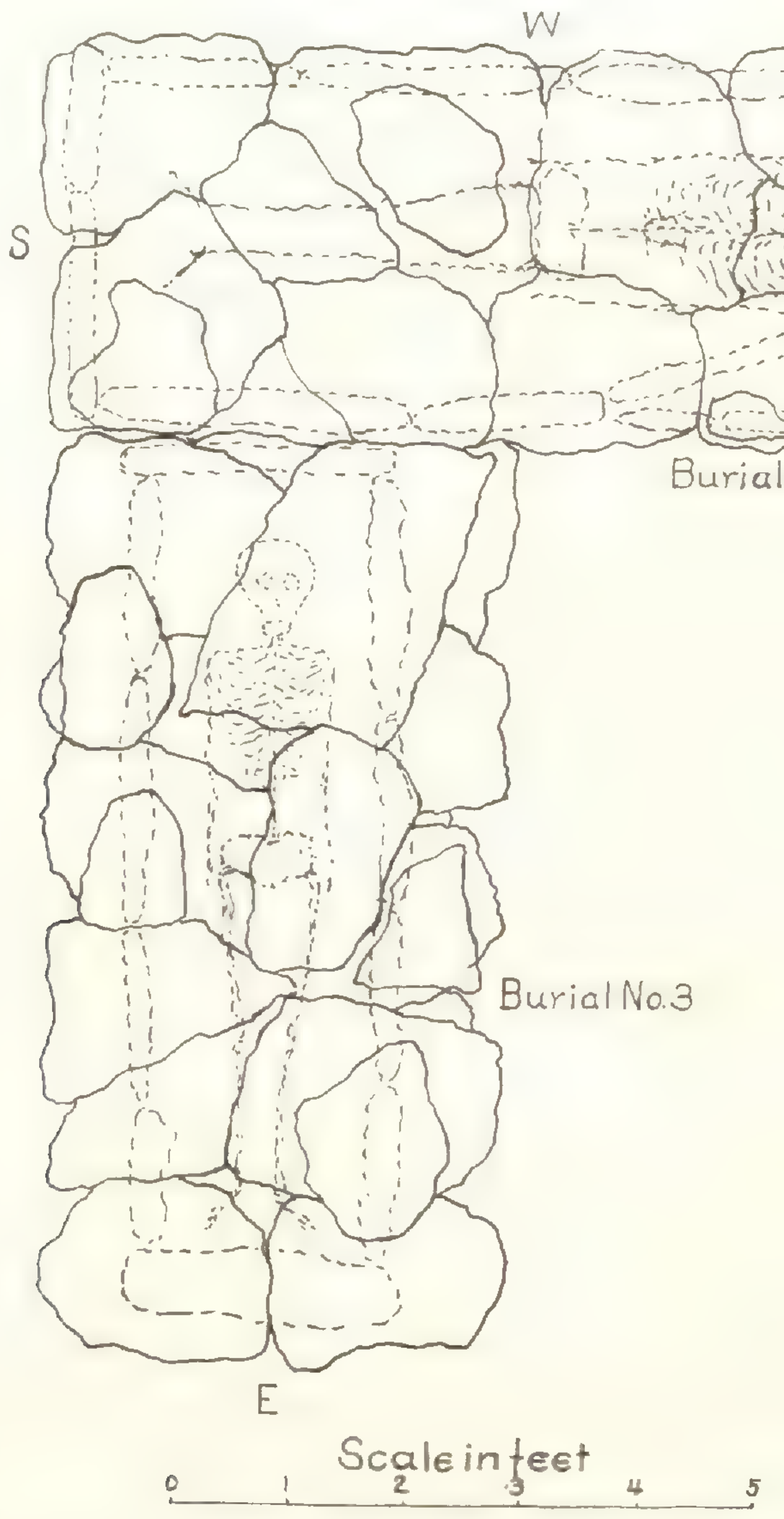

Fig. 23.—Burials Nos. 3 and 4. The Martin Place.

At the northeastern corner of this small compartment a few stones were missing, evidently through a recent disturbance. In our diagram these stones are represented as in place.

Burial No. 5. This burial was contained in a grave 9 feet in length, nearly 4 feet in width, and 2 feet in height, outside measurement. The sides, some of whose slabs were very large, slanted inward as to their upper parts, giving a very uneven appearance to the covering slabs which remained, a few having been removed from one part of the grave by a previous digger. The upper part of the grave, from which these slabs had been removed, nearly approached the surface.

The grave had been floored with slabs, but the upright stone which presumably had been at one end (that at the other end being present) probably had been removed by previous digging, and the flooring at this point also was missing.

Throughout this grave, whose inside measurement ranged between 16 and 20 inches in height, were human bones in no anatomical order, though an effort clearly had been made to place the long bones longitudinally and horizontally.

Thirteen skulls, all much decayed, as were the other bones, were present. As to the discovery of artifacts, as is usually the case with stone graves, we had our labor for our pains, as the saying goes.

Mound and Site on the Cherry Place, Butler County.

On the property of Dr. E. A. Cherry, of Morgantown, Ky., on a hill, is a mound about one quarter of a mile back from the river, in a straight line. This mound, 3 feet 6 inches in height and 32 feet by 22 feet in basal diameters at the present time, seemingly had been greatly dug into before our coming, as quantities of masses of stone, evidently from it, lay in all directions on its surface. So numerous were these masses that it seemed to us more likely that the mound had been an ordinary stone mound of the kind so often found on hilltops, rather than one containing a large single grave.

On an adjoining field of the same property, under and around the home of the tenant occupying Doctor Cherry's place, evidently had been a cemetery of stone box-graves, traces of a number of which still remained. Four of the better-preserved graves examined by us were without covering and had been rifled but had the sides and ends still remaining.

Mounds near Little Reedy Point, Butler County.

On the property of Mr. G. M. Taylor, who lives upon it, is a high ridge, one end of which, reached by a winding road, looks down upon the river. On this extremity of the ridge are two mounds near together, while two others but a short distance apart are about one hundred yards back along the ridge which, where the mounds are, is covered with light woods.

These mounds, which unfortunately had been thoroughly dug out previous to our visit, had each contained a single, large grave, judging from part of the contents of one mound not wholly scattered.

The mound in question, 21 feet in diameter, centrally had contained a stone grave 7 feet 10 inches in length and 3 feet 5 inches in width, inside measurement, built of slabs and masses of sandstone and of limestone, the masses in nearly every case showing flat surfaces which had been utilized in the construction of the grave, giving it interiorly a comparatively regular surface. Unfortunately one of the longer sides, which was almost perfectly even, could not be shown in the photograph (Fig. 24) owing to the presence of trees where the camera must needs have been placed to show it. The large block seen projecting from the side at the reader's left in the illustration, had not been originally placed as it now is, but owes its position to the roots of a neighboring tree, which have pushed it beyond the general line of the wall.

This interesting grave had not been constructed, the reader will note, as

Fig. 24.—Stone grave. Little Reedy Point. (7 feet 10 inches by 3 feet 5 inches, inside measurement, depth 2 feet 3 inches.)

the box-graves were, with slabs and masses arranged on edge (with the exception of a large slab at one end of the grave which was so placed), but had been regularly built up from the yellow, undisturbed clay which served as a foundation, of slabs and blocks laid on their sides as in the case of walls, to a height of 2 feet 3 inches. Presumably this height, plus that of the covering slabs (which had been removed and lay on the sides of the mound) and the thickness of some soil above them represented the original height of the mound.

The largest of the covering masses was 3 feet in length by about 2 feet in width, not sufficient to have spanned the grave. Possibly the covering slabs originally were held in place by interior supports, perhaps of wood, as has been suggested was sometimes the case with some of the stone box-graves.

Within the grave a few fragments of human bones had been left by the diggers.

The remaining three mounds, one of which was larger than that described, one of about the same size, one smaller, had been so completely dug out that the single graves they probably had contained were represented only by scattered masses of stone.

Indian Hill, Edmonson County.

This site, well known locally, is a table-land surrounded on all sides by a bluff, about one mile NE. from Brownsville, Ky. The site was carefully examined but did not seem to be covered with the usual layer of black soil, which possibly had washed away from so exposed a position. A few coarse arrowheads of black flint were found on the surface. Owing to the field being planted in wheat no digging was attempted.

CERTAIN ABORIGINAL SITES ON OHIO RIVER.

In the following list all mounds of any considerable size in the territory visited by us (namely, between the mouth of Ohio river and Evansville, Indiana) are included, and all dwelling-sites which seemed to be of any interest are described.

Mounds and Sites.

Mounds and site on the Terrell Place, Ballard County, Kentucky.
Mounds at Mound City, Illinois.
Dwelling-site near Colvin Lake, Ballard County, Ky.
Dwelling-site near the mouth of Massac Creek, McCracken County, Ky.
Dwelling-site near Owens Ferry, Massac County, Ill.
Mounds and site on the Kincaid and Lewis Places, Massac and Pope Counties, Ill.
Aboriginal Cemetery on the Thirlkill Place, Livingston County, Ky.
Aboriginal Cemetery on the Davis Place, Livingston County, Ky.
Aboriginal Cemetery near Bay City, Pope County, Ill.
Aboriginal Cemetery on the Orr Place, Hardin County, Ill.
Mound near Murphy Landing, Posey County, Indiana.

Mounds and Site on the Terrell Place, Ballard County, Ky.

Holloway is opposite Mound City, Ill. Following the road inland about three-quarters of a mile from Holloway, on the property of Mr. James R. Terrell, Kevil, Ky., are two mounds, formerly quadrilateral with flat tops, now greatly trampled and washed. One of these, 24.5 feet high, has a diameter of base of 173 feet E. and W. On the south side has been a causeway leading up to the mound, while on the north side is a causeway connecting the mound with the other one about 40 yards away. These causeways made impossible the determination of the diameter of the base of the mound northerly and southerly.

The second mound, 15 feet high and 172 feet N. and S., in diameter of base, has a frame structure upon it.

As these mounds are of vital necessity in times of high water, no digging on them was attempted.

In the same great field in which are the mounds are two ridges, on one of which are several humps. These ridges and humps, evidently made by the aborigines, had apparently been gathered from the rest of the field and piled, not deposited by the accretion of dwelling-site material, as very little debris was mingled with the clay composing them. One of the humps, extensively dug into by us, yielded neither artifact nor burial. Holes in the other ridge came upon, in one instance, a burial extended on the back, slightly more than 3 feet deep.

Pottery on the field was undecorated as a rule, though one fragment of thin ware was found, having a coating of crimson pigment, and another bore a design in relief, elliptical, possibly intended for an ear on an effigy vessel.

Mounds at Mound City, Illinois.

Mound City, Ill., named after aboriginal high places formerly there, was visited by us, but the mounds, with the exception of one about 7 feet in height, had been removed to furnish material for the levee. There is no history of the discovery of artifacts during the demolition of these mounds, and the remaining one, we learned, had been dug into without discovery of relics.

Dwelling-Site near Colvin Lake, Ballard County, Ky.

This site, shown on our map of Mississippi river in this report, is about ten miles above Mound City but on the opposite side of the river. Colvin lake, about one-half mile back from the river, is itself part of a former course of the Ohio, but is now enclosed by land and called a lake, as it is the custom to do in such cases in the Mississippi valley and elsewhere.

On the border of Colvin lake, on the property of Col. W. H. Viets, of La Center, is a large aboriginal dwelling-site having much debris on the surface, including fragments of pottery but with few other artifacts. Near the end of a ridge on which the dwelling-house on the property stands, in a cultivated field,

is a slight rise, largely of sand, which is filled with burials and probably was the principal cemetery of the place, though doubtless scattered burials were made throughout the site. In fact considerable digging over parts of the remainder of the property came upon the remains of one infant.

When thirty-six burials had been taken from the rise digging was discontinued owing to the paucity and the inferior quality of artifacts with them.

These burials, thirty of adults and adolescents, six of infants and older children, showed that the form of burial mainly practised in the place was at full length on the back, though one adult skeleton was closely flexed on the back, and there were three regular, bunched burials, each of a pile of parallel bones with a skull. There was also a bunched burial made up of a mingling of bones including fragments of three skulls. There had been great disturbance in this cemetery, caused by intersecting graves.

The burials, none deeper than 2 feet, except in one instance where one lay in a narrow grave nearly 4 feet from the surface, were so easily reached and lay in such a favorable medium for the preservation of relics that it is unfortunate that artifacts had not been placed more numerously with them, and that such as had been deposited were not of better quality.

One burial had at the skull a flat mass of jet 9 inches by 6.5 inches by 2.5 inches; another had at the head two small earthenware pots, about the same size, each having a row of encircling knobs below the opening, while another burial had a pointed implement of bone near the head.

Burial No. 9, extended on the back, was without a skull in proper position, though one lay near the pelvis. On the lower part of the thorax was a shell gorget with some kind of a decoration, much encrusted and badly decayed. At the outer side of the right humerus was a slab of silicious material, 1 foot long, 4.75 inches in maximum width, about 1 inch in thickness, lying flat. A considerable depression in this slab indicated its former use as a hone or mortar. On it lay a long spike-shaped arrowpoint or drill, of flint. At the right hand of the burial were a chisel and three triangular arrowheads, all of flint. Near this burial was a small, undecorated, toy bottle of earthenware, but so much disturbance was evident in the neighborhood that one could not determine if the vessel belonged to this skeleton or not.

A burial of an adolescent, somewhat disturbed, had near it a small earthenware pot with two loop-handles; with the burial of a child was associated a very elementary effigy form, two knobs indicating eyes.

The skeleton of a child had a few discoidal, shell beads at the neck; near the head of the skeleton of an adult was a small mass of iron ore used as pigment; near the left leg of an adult skeleton stood a small, undecorated water-bottle.

An adult burial had at the skull a piercing implement of bone in fragments, a diminutive slab of sandstone, a mass of hematite about 1.5 inch by 1 inch by .5 inch, and a small mass of vesicular lava. A short distance from the skull was a water-bottle, undecorated, with wide mouth, more suited in size for a child than for an adult.

With the largest bunch burial were: a pot having two loop-handles and a rude, current scroll around the body, containing a musselshell in fragments, no doubt formerly used as a spoon; an undecorated pot having two loop-handles, inverted over a small undecorated bowl; a pot without decoration, having two loop-handles. One somewhat similar to the foregoing was with another bunched burial.

In the midden debris were several arrowheads and piercing implements of bone; also half of an effigy vessel representing a fish.

Dwelling-Site near the Mouth of Massac Creek, McCracken County, Ky.

Near the mouth of Massac creek, on the property of Mr. J. D. McElya, living nearby, is an aboriginal dwelling-site of promising appearance, no doubt containing a large number of burials. After twenty skeletons had been removed without the discovery of an associated artifact, work was discontinued.

Dwelling-Site near Owens Ferry, Massac County, Ill.

Near Owens Ferry, opposite Paducah, Ky., on property of Captain Brack Owen, of Paducah, is a dwelling-site into which twelve holes were sunk without encountering signs of interment.

Mounds and Site on the Kincaid and Lewis Places, Massac and Pope Counties, Ill.

About six miles above Paducah, Ky., but on the Illinois side of the river, a mile inland from Kincaid Landing, is by far the most promising site seen by us on Ohio river, on which are seven mounds on the property of Mrs. T. M. Kincaid, and eight on the adjoining land of Messrs. T. and E. Lewis.

All these mounds were seen but not measured by us, as we were unable to obtain permission to dig them. According to our agent, a good judge in such matters, who examined the mounds more carefully than we did, their heights range all the way to 30 feet. Doubtless the smaller ones would be more productive, were any result obtained by digging into them.

Aboriginal Cemetery on the Thirlkill Place, Livingston County, Ky.

On government land which formerly was part of the Thirlkill Place, on ground overlooking the river, in a restricted area of sand, had been a number of stone box-graves with flooring of limestone and of sandstone.

All the graves had been somewhat disturbed by cultivation, but the ten best preserved—eight extending easterly and westerly, and two northerly and southerly—were examined by us. The skeletons, badly decayed, had not been placed uniformly; for example, some in the graves running E. and W. having the heads to the east, others to the west.

No artifacts were found with the burials, nor is there a history of any from this place.

Aboriginal Cemetery on the Davis Place, Livingston County, Ky.

About one mile below the union of Cumberland river and the Ohio, on the property of Mr. C. B. Davis, of Smithland, Ky., on the first high ground near the dwelling-house of the estate, have been numerous stone graves, slabs and parts of graves remaining. Many graves are reported to have been found on the place during the digging of a shallow pond for hogs. While no entire grave was found by us, the former presence of a box-grave with a flooring was indicated. There is no history of the discovery of artifacts.

Aboriginal Cemetery near Bay City, Pope County, Ill.

On the verge of tableland overlooking the river, about one-half mile NW. by W. from Bay City, on property belonging to Mr. R. H. Dunning of that place, is a group of stone graves of the box variety, having floors. The tops of these graves have been plowed away and piles of slabs of sandstone and of limestone from graves of the group lie around. The owner recalls no artifact having been found there in the last thirty years.

Aboriginal Cemetery on the Orr Place, Hardin County, Ill.

This place, of which Mr. David Orr is owner, is a short distance below Elizabethtown, Ill. It formerly has had a considerable stone grave cemetery of the box variety of grave, on the high ground just above the river. Squarely across the road, which is a short distance back from the margin of the high ground, are rows of slabs on edge, being the sides of stone graves and presenting a curious appearance in such a place. Such graves as we found had been disturbed, though bones remained in some. With one skeleton was a knife of flint, somewhat more than 3 inches in length.

The discovery of other graves while plowing back in the field is reported, but the field is planted in alfalfa and investigation was possible only in a few bare spots, in which nothing was found. There is no history of the discovery of artifacts in the graves on this place.

Mound near Murphy Landing, Posey County, Indiana.

About twelve miles by water below Mount Vernon, Ind., on the property of Mr. J. L. Faulhaber, of Elwood, Ind., is a mound, 16.5 feet in height, which has been quadrilateral but is now of somewhat irregular outline, its diameters of base being 290 feet ENE. and WSW., and 188 feet NNW. and SSE. On the flat top of the mound are various wooden structures. We attempted no digging in this mound, which no doubt was domiciliary, as a high place like this is of great importance when the river is in flood.

MAP OF PART OF MISSISSIPPI RIVER

Scale in miles

0 5 10 20

1916

ADDITIONAL INVESTIGATION ON MISSISSIPPI RIVER.

As we have stated elsewhere, the territory along the Mississippi covered by us this season lay between Memphis, Tenn., and Cairo, Ill., where the Ohio joins the Mississippi, though no digging was attempted by us in certain sites within about thirty miles of Memphis, which had been explored in a previous season.

The mounds and sites of any importance visited by us this year are as follows:

Mounds and Sites.

Mounds near Fulton, Lauderdale County, Tennessee.
Aboriginal dwelling-site at Hale's Point, Lauderdale County, Tenn.
Mound on the McCoy Place, Dyer County, Tenn.
"The Neeley Mounds," Dyer County, Tenn.
Mounds on the Markham Place, Lake County, Tenn.
Mounds on the Bandy Place, Pemiscot County, Missouri.
Mounds on the Davis Place, New Madrid County, Mo.
Mounds on the Hunter Place, New Madrid County, Mo.
Mounds near New Madrid, New Madrid County, Mo.
The Campbell Mound, Fulton County, Kentucky.
Mounds on Pinhook Ridge, Mississippi County, Mo.
Mound on the Chaney Place, Hickman County, Ky.
Mounds on the Turk Place, Ballard County, Ky.
Mounds on the Edwards Place, Ballard County, Ky.
Aboriginal dwelling-site at Wickliffe, Ballard County, Ky.

Mounds near Fulton, Lauderdale County, Tenn.

On Chickasaw Bluff, overlooking the river, on the property of Mr. T. F. Moore, of Fulton, Tenn., are two mounds and a remnant of another, about three-quarters of a mile below the town. There are said to be other mounds nearby, which we did not visit.

The largest mound, about 14 feet in height and 100 feet across its circular base, is covered with a grove of locust trees which it was desired to preserve.

The other mound, about 50 yards from the first, had been under cultivation and its dimensions evidently had been modified. Its height was slightly less than 10 feet; the diameter of base about 90 feet.

An excavation, 12 feet square, was carried to and beyond a well-defined base-line which was reached at a depth of 12 feet from the summit of the mound. No burial was encountered and no sign of a grave was discernible in the base, which was of so marked a character that any space filled in with material other than that of the base could not have escaped our notice. The mound, in which were various thin layers, presumably indicating short periods of occupancy, evidently had been a domiciliary one.

Aboriginal Dwelling-Site at Hale's Point, Lauderdale County, Tenn.

The well-known aboriginal site at Hale's Point, where Mr. Hall spent considerable time making part of the fine collection of pottery now in the possession of the Davenport Academy of Sciences, Davenport, Iowa, has been washed away by the Mississippi, sharing the fate of Pecan Point, Ark., somewhat below it on the river, where much investigation was carried on by the Bureau of American Ethnology, and later by ourselves.

A field on Hale's Point, separated from the river by a narrow patch of woods, belonging to Mr. S. C. Forsythe, living nearby, is covered with about one foot of comparatively recent alluvial deposit which, while enriching the place from an agricultural point of view, somewhat interferes with the discovery of aboriginal burials which are present in the field. The site has been prodded over and dug by the Indian Crowfoot, who has done so much work in the St. Francis river region, Ark., and elsewhere, with the view of discovering Indian pottery for the market.

Our investigation at Hale's Point was carried on during three days in the field described, on a low, short ridge parallel to, and a few yards from, the woods. During this time water from the river in flood was seeping into our digging, making our work hard to carry on to advantage.

Fifty-four burials were encountered, as follows: of adults, 33; of adolescents, 8; of infants and children, of which one was an urn-burial and two others partaking of the nature of urn-burials, 13.

The adult and adolescent burials, some of which had been disturbed to some extent by intersecting graves, were extended on the back, with one exception, four of the skeletons having the feet crossed at the ankles.

A skeleton found in the utmost disorder near a refuse pit presumably had been disturbed when the pit was dug.

No burial except the disturbance, which was somewhat more, was deeper than 4 feet 4 inches from the present surface, which, as stated, is on a comparatively recent deposit about one foot in depth. The deeper burials, below the level of the river at the time, were removed with difficulty from regular bogs of mud and water.

Skeletal remains at this place were in fairly good condition, eleven skulls with most of their skeletons, one of these including a united fracture of a left radius, being obtained for the National Museum.

Reminiscent of the urn-burials found at Hale's Point by Mr. Hall, our Burial No. 4 consisted of an earthenware pot, undecorated, 14 inches in height and about the same in maximum diameter, having two solid projections for handles on each of two opposite sides.

In this vessel were most of the bones of a child, on the bottom being the pelvis, ribs, phalanges, one os calcis, but no vertebræ. Laid across irregularly, but in the same general direction, were the bones of the arms. Above these again were the long bones of the lower extremities, parallel, in an oblique position,

their upper ends resting against the side of the vessel. Supported by these and by the side of the vessel was the skull. Over the containing pot had been an inverted bowl, without decoration, having two small projections for handles, which was badly crushed, the base of it having fallen in upon the bones, which did not fill more than half the lower vessel, part of which also had given way under the pressure from above.

Burial No. 5, the bones of an infant, having over the skull and thoracic part a fragment of a pottery vessel, of irregular outline, 9 inches by 10.5 inches, approximately, from beneath which the pelvis and legs projected.

Burial No. 12, adolescent. At the left shoulder were two elongated arrow-points of flint and one of antler, while near the skull was what seemed to be a mass of red pigment in the mud and water in which it lay. Accompanying this was an astragalus of an elk, carefully smoothed on the sides seemingly for use as a die in some kind of game.

Burial No. 14 had red hematite at the feet.

Burial No. 21, adolescent, had at each side of the head a shell ear-plug of the bracket-shaped variety, having near the end of the shank a perforation to furnish additional security by attachment. The ends of these ornaments lay under the skull, showing that the flat part of the ear-plug had been against the outer side of the lobe of the ear. At the neck of the skeleton was a single bead of shell, of irregular outline, about .75 inch in diameter.

Burial No. 29 had, at the left of the skull, a pottery bottle, and on the middle of the trunk a miscellaneous assortment of objects in a pile as follows: several arrowflakers of antler; fragments of handles of antler, with which were two incisors of the beaver, which presumably had been in the handles; four long, piercing implements of bone, one very imperfect; a pebble, probably a smoothing stone; a small celt of shale; six flakes of flint; a small mass of agate; two rude chisels of flint, 4 inches and 7.75 inches in length, respectively; two rude implements or weapons of flint, perhaps blunt knives; thirteen arrowheads, knives, and spearheads, of flint, the longest about 4 inches, nearly all more or less imperfect.

Burial No. 32, adolescent, had two vessels at the head, and at the neck an irregular fragment of shell having a perforation, which may have been part of a gorget.

Burial No. 34 had on the sacrum two small rings of bone, very fragile, broken on removal.

Burial No. 48. In addition to a bowl near the head there was, with this burial, at each side of the skull, a number of bone pins much decayed and broken.

Burial No. 51, an infant, had the skull covered with a fragment of a large vessel, the concave side downward.

A number of burials had only earthenware vessels associated with them. Thirty-two vessels were met with at Hale's Point, one apart from human remains. The vessels with burials, always near the head at this place, never more than

three together, are representative of the general run of the pottery of that part of the middle Mississippi region included in Tennessee, which pottery, taken together, is inferior to the earthenware of Arkansas north of Arkansas river, which is also in the Middle Mississippi region.

One of the bottles found by us at this place has a representation of the aboriginal idea of a frog, which is endowed with a tail. In relief on one side are shown the head and two legs, and, on the other, the remaining two legs and a tail. Another bottle belongs to the human effigy class, the face of the figure being in relief on the neck of the bottle. These vessels are shown in Fig. 25.

Fig. 25.—Vessels of earthenware. Hale's Point, Tenn. (Heights 8.75 inches and 6.75 inches, respectively.)

There are also bowls having handles representing heads and tails of fish; bowls with beaded margins, and pots having upright fillets around the neck. The usual proportion of coarse, undecorated ware (which the investigator always finds unduly great in this region) also was present.

The use of color appears but twice: a bowl has traces of red pigment, and a small bottle has parallel, vertical bands of red and white alternating. The effect produced by these efforts to decorate in color is disappointing, the ware being coarse, shell-tempered, and without the slip, or coating, required on such material for a successful application of painted decoration.

In the soil, apart from burials, were: a small celt seemingly of igneous rock; four pottery discs; a number of bones of a bison (*Bison bison*); an effigy of the head of some animal, from a large pottery vessel; a well-preserved implement of bone, flat at one end, perhaps used in basketry.

Mound on the McCoy Place, Dyer County, Tenn.

On the McCoy Place, said to be twenty-five miles up Forked Deer river, is a mound in a cultivated field, in view from the water, on property of Mr. A. D. Burks, living nearby. The mound, considerably plowed away, is 5 feet in height and 50 feet in diameter of base, which is irregularly circular.

A central excavation, 12 feet square, showed the mound to be of sandy clay, and while without a marked base-line, to be upon undisturbed clay at a depth of 4 feet from the top.

At a depth of 18 inches, with traces of a skeleton at length, was part of a pot having had a scanty and rude scroll decoration.

About 3.5 feet in depth, perhaps placed with a skeleton no longer remaining, for no bones were found, was an undecorated pot of most inferior ware, which offered slight resistance when a shovel cut through it. This vessel, somewhat verging on the bottle in form of body, is rather elongated and constricted toward the opening, on each of two opposite sides of which is a loop-handle.

Near the base of the mound, separately, were several rude balls of clay, perhaps used in the Indian hand-game. A similar ball came from one of the holes dug by us in level ground near the mound.

The Neeley Mounds, Dyer County, Tenn.

On the property of Mr. Sterling Fowlkes, of Dyersburg, Tenn., are the Neeley mounds, so-called locally, all near together in woods, about 1.5 mile in a straight line northeastwardly from Booth Point landing. There are two mounds and a number of low ridges or rises, the latter, so far as could be determined, being due to wash of water and not to agency of man, though some had been lived upon by the aborigines and used as places of burial to a limited extent. Our investigation of this place was interfered with by stormy weather and by back-water from the rising river.

Mound A.

This mound, of sand, like the neighboring mounds and rises, was 2.5 feet high and 45 feet across the circular base. On it, as elsewhere on this site, was a small deposit of clay, probably from recent overflows of the river. This small mound proved to be of considerable interest in that it furnished, like the site at Hale's Point below it on the river, examples of urn-burial, a custom not widely practised by the aborigines of Tennessee.[1]

About centrally on the base of the mound, which was 2 feet 9 inches from the surface, was a group of four vessels practically in contact one with another. Three of these were pots of comparatively thin, shell-tempered ware that fell in fragments on removal. All were undecorated save for the presence of two loop-handles, one on each of two opposite sides, if this could be called a decoration.

[1] See our article on urn-burial in "Handbook of American Indians."

The principal of these vessels was 15 inches in height, 16.5 inches in maximum diameter, and 13 inches across the opening. Within the pot were some of the small bones lying on the bottom, a skull resting against the side above them, and fragments of long bones around the skull. Many of the bones in this pot showed marked effect of fire, including the skull, which went to pieces when removed. Other fragments of bone, however, were without evidence of the action of heat.

Another pot, 12 inches in height, 15.5 inches across the widest part, and having an opening one foot in diameter, illustrates the spirit of economy that was strong in many of the aborigines. The bottom of the pot, missing through breakage preceding the time of interment, had been replaced by a platter or basin arranged below the missing part. This basin was itself defective, a part of the rim being absent. On the basin was coarse, incised decoration, consisting of lines and circles.

This composite receptacle, illustrating in a way that two wrongs can make a right, contained the bones of an adult, showing no trace of the effect of fire. In the basin, on the bottom, were the pelvis and small bones. Next, the long bones had been placed diagonally in the vessel, and on the slant of these rested the skull which, like all crania found at this place, dropped to pieces when removed.

The third pot, 11.5 inches high, 16.5 inches in greatest diameter, 12 inches across the opening, contained small bones on the base, on them resting the skull, over which were the long bones placed obliquely.

A singular feature of this burial, adult like the rest, was that the bones and fragments immediately on the base of the pot clearly showed the action of fire, while none of the bones above them did so, thus indicating that the vessel with its contents had been placed over a fire for a time. The ceremony, however, must have been performed apart from the site of the urn-burial, as no sign of fire was apparent in the neighborhood.

The fourth vessel, without shell tempering, of inferior ware, as was practically all the earthenware, was a cup-shaped bowl having had the effigies of a small head and tail extending from the rim at opposite sides, which had been broken off and lost prior to the interment. Three incised circles surrounded the upper part of the bowl, curving under the places where the head and tail had been. This vessel, of medium size, contained no burial.

Surrounding the group of vessels was a deposit of bones and fragments of bones in no order whatever, including six skulls. This deposit, an indiscriminate mixture of bones, some showing the mark of fire but more being without it, was from 4 to 5 inches in thickness and 5 feet 9 inches by 5 feet 4 inches in extent, irregular with rounded corners, having from one of them an extension 2 feet wide and 18 inches in length. Below and between the pots were no bones, though we have included the space occupied by the vessels in giving the dimensions of the deposit.

In the soil near the pots was a small, rude effigy of earthenware, representing the head of a bird, perhaps a toy, as it displays no broken area as would be the case did it come from a vessel. Near this was a ring of earthenware somewhat more than 1.5 inch in diameter, resembling a section of the neck of a bottle, but showing no irregularity of the margins. The ware also gives evidence of an even effect of heat inside and out; the object probably was made as it now is, for some purpose.

In the bone deposit was part of a rude pipe of earthenware, having a base on which to rest, the bowl and the orifice for the stem forming the upper part of what was hardly more than a lump of burnt clay.

Also in this mound were encountered (as explained, our investigation was not complete) four unenclosed burials. One, traces of a skeleton extended, lay 2 feet below the surface. At the head were a flake of flint; a pebble; a small mass of hematite paint; a trowel of earthenware, mushroom-shaped; part of another one; a mass of jet 3 inches by 3 inches by 1.25 inches. With these were two pots, each of less than one quart capacity and having two loop-handles. One of these, having a rude attempt at decoration in the way of lobes, was inverted and contained an earthenware trowel having a small part missing, and a mass of jet of about the same size as the other. These masses seem to have been subjected to considerable wear or intentional polish, one being especially smooth.

The three other burials from this mound were cremations, deposits of burnt and calcined fragments of bones not far from the surface, one 2 feet by 30 inches in area and 6 inches in thickness, having parts of three skulls; the other two somewhat smaller, and evidently individual burials.

Mound B.

Mound B had been used as a refuge for cattle in flood time, and was much trampled and spread. Its height was 4 feet; the diameter of its circular base, 82 feet. A distinct base-line was noticed 3.5 feet from the top of the mound.

What probably constituted most of the original area of the mound was covered with numerous trial-holes by us, resulting in the discovery of twelve burials (two being of children), excluding many fragments of human bones scattered throughout. The burials, all badly decayed, were in depth from a few inches from the surface to a central grave in the base of the mound, 6 feet 3 inches by 2 feet 10 inches, and extending 1 foot 4 inches into underlying sand beneath the mound, previously undisturbed.

In form the burials were extended on the back, flexed, and of the bunched variety; also several fragments of human bones affected by fire were encountered.

The following burials were accompanied with artifacts:

Burial No. 1, a bunched burial having one skull and seven femora, in addition to other bones, had associated a flint blade, leaf-shaped, 6.5 inches long, 2.1 inches in maximum width, and a small mass of lead sulphide.

Burial No. 3, extended on the back, had at the right of the skull a cup-shaped vessel from which, presumably, a head and tail of an effigy had projected; also a mass of oölitic hematite iron ore, having a deep depression in which rested a lump of red hematite showing flat surfaces where grinding had taken place—here was evidently a kind of paint cup with its contents. At the right of the pelvis were traces of a rattle of tortoise or turtle shell, having contained pebbles.

Burial No. 7, a child, had with it an undecorated bowl and fragments of a rude, human-effigy vessel.

Burial No. 8, a child, also had associated with it parts of a rude, human-effigy vessel, and fragments of a coarse pot having had two loop-handles.

The burial in the grave was without artifact.

Four of the rises at this place were dug into to some extent, one showing no sign of burial in the raw sand, another having fragments of uncremated bones, being part of a burial apparently extending under a large tree.

In another rise, 14 inches from the surface, was a deposit of carbonized bones, including a single skull. Also were encountered the unburnt remains of an infant's skeleton, 30 inches down, covered by the base of a large vessel, the fragment being about 9 inches square.

In the fourth rise investigated were two small deposits of cremated remains, probably individual burials, and another, 2 feet by 7 feet in extent, beginning near the surface and slanting down to a depth of 1 foot 8 inches.

Near the surface was a central, cremated deposit 4 inches to 6 inches in thickness, including eight skulls, crushed when found, though represented apparently in all their parts. This area, oblong with rounded corners, 7 feet long by 2 feet wide, approximately, could not be definitely defined, as fragments of burnt bones were scattered here and there in the soil adjacent to it. With this deposit was a fragment of a bowl of thin and fairly good ware, and also a diminutive pot containing material in small fragments, of which Doctor Keller writes:

"I have made a careful qualitative and rough quantitative analysis of the black material from Neeley Mounds. It turns out to be a silicate resembling hornblende. It contains over 60 per cent. silica, about 20 of alumina and 11 oxide of iron. Also a few per cent. of lime and magnesia (rather more of the latter than of lime), and traces of manganese and alkalies. Ordinary hornblende contains less of both silica and alumina, and more of lime and magnesia. Like hornblende it is very hard, gives a gray powder, and melts before the blowpipe, giving slightly magnetic globules, and is only slightly attacked by acids. It is not distinctly crystalline, however. I think it is perfectly safe to call it a silicate of the hornblende or augite type."

In connection with this deposit of cremated remains was a feature not noted in the other cremated burials at this place. With the bones, mainly above them, to a limited extent, was sand reddened by fire. Below the bones was no

trace of heat. It was evident, then, that the cremation had been performed elsewhere and the reddened sand gathered up with the bones.

Mounds on the Markham Place, Lake County, Tenn.

Going in a short distance from the river, about one-half mile below Bass Landing, one reaches the property of Mr. A. E. Markham, of Tiptonville, Tenn., on which is a mound about 7.5 feet in height, covered with recent graves, and five remnants of mounds. These remainders, which have been under cultivation for a considerable time, are in no case more than 3 feet in height.

Two of these, having heights respectively of 2 feet and 2 feet 9 inches, and diameters of 50 feet each, were investigated by us, holes 8 feet by 10 feet and 8 feet by 12 feet being carried to the base.

Centrally in the smaller excavation, beginning at the base and extending 2 feet into the underlying clay, was a grave 3 feet 4 inches wide by 8 feet long, containing the remains of a skeleton at full length, having at the right hand a coarse, undecorated pot in fragments, and at the outer side of the left shoulder a pipe of claystone, of the monitor type, also greatly broken, which, put together and slightly restored, is shown in Fig. 26.

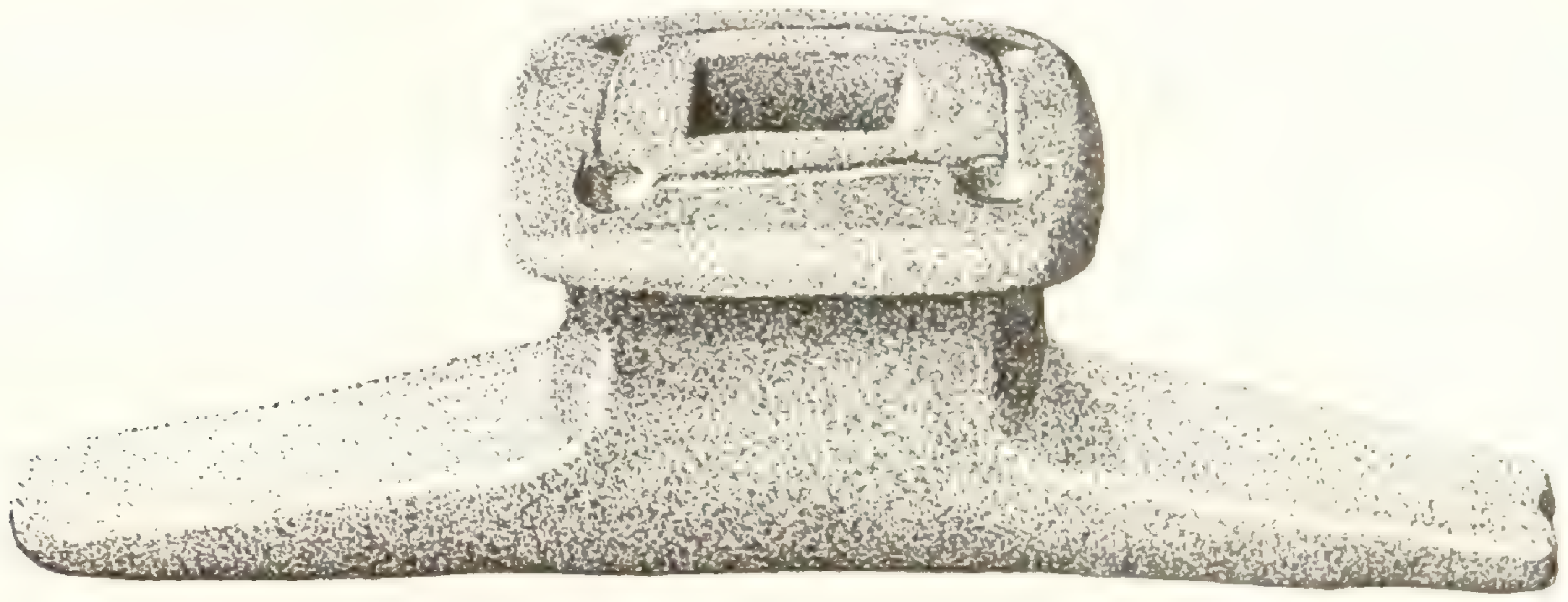

Fig. 26.—Pipe of monitor type. The Markham Place, Tenn. (Full size.)

In the smaller mound (having, however, the larger excavation, necessitated by finding a grave away from the center of the base) was a grave 10 feet 2 inches long by 6 feet 7 inches wide, having a depth of 2 feet 8 inches below the base of the mound. This grave was not entirely cleared owing to the pouring in of water, the river being in flood. So far as determined, no artifacts accompanied a burial, which lay in a kind of quicksand.

Mounds on the Bandy Place, Pemiscot County, Mo.

On the western side of Jim Ellis Cypress, a swamp about 1.5 mile WSW. in a straight line from Stewart, a settlement, are, on the Bandy Place, now belonging to the Hon. William Hunter, of Benton, Mo., thirteen mounds forming an irregular line along the swamp. Adjoining Mr. Hunter's property at the upper end are five other mounds, and on adjacent properties just below the

Bandy Place thirty mounds spreading over the fields were counted by us. In fact an aggregation of mounds is said to continue down the Cypress and even into Arkansas.

All the mounds examined by us, many of which have been under cultivation, have had circular bases, and none exceeded 7 feet in height, which was exceptional, though in woods beyond the places visited by us some of the mounds are said to be larger than those we saw.

Three mounds never under cultivation, in woods on the Bandy Place, were selected by us for examination. The mounds, respectively 4 feet 7 inches, 4 feet 5 inches, 3 feet in height, had each a diameter of somewhat more than 40 feet. All were of clay differing in shade from the underlying, undisturbed ground, and thus had base-lines easily distinguishable.

In the largest mound a hole 8 feet by 10 feet was carried to the base, while excavations 8 feet square were put down in the others.

In each instance, centrally in the base, a grave was reached, the largest being 9 feet 3 inches in length by 4 feet 6 inches in width and extending 2 feet below the base into the underlying soil. The other graves were somewhat smaller.

In each grave were faint traces of bones and of teeth, indicating a burial at length. No artifact of any kind was found, though great care was devoted to the search, the graves being dug out with a trowel, as it is our custom to do.

Mounds on the Davis Place, New Madrid County, Mo.

About 2.5 miles in a northerly direction from the settlement known as Stewart, on property of Mr. W. E. Davis, of Point Pleasant, Mo., adjacent to Double Bridges, a well-known crossing, and following the bank of Open Bayou, is a group of twenty-three mounds, most of which have been long under cultivation. These mounds range in height between 2 feet and 5 feet and are from 35 feet to 50 feet across their circular bases. There is no history of the discovery of artifacts or of bones during cultivation, and none of the mounds seem to have been dug.

Two of these mounds on fallow land were selected for investigation.

Mound A, 4 feet 9 inches in height, diameter 50 feet, proved to be of clay dry and hard when an excavation 10 feet square was carried to the base. Nothing was found in the body of the mound, but at the central part of the base was a grave having a length of 7 feet 8 inches, a width of 3 feet, and extending about 1 foot below the line of the base, which was 5 feet 7 inches from the top of the mound. On the bottom of the pit were decayed remains of a skeleton, at full length on the back, the head ENE.

Mound B, slightly smaller than the other, was similarly investigated. No grave or burial was encountered, nor was the presence of a pit below the base discovered. The composition of the mound was such that the determination of a pit would have been difficult, and it is very likely that a sub-basal burial in a shallow grave, which was not found, had decayed away.

Mounds on the Hunter Place, New Madrid County, Mo.

In a cultivated field about 2 miles in a westerly direction from the town of Linda, Mo., on property belonging to the Hon. William Hunter, of Benton, Mo., whose courtesy to the Academy we already have had occasion to mention in this report, is a mound slightly more than 4 feet in height and about 70 feet across its irregularly circular base. This mound has been much trampled by cattle, and to add to its unsymmetrical appearance, a considerable hole, remaining unfilled, had been dug into one side of it. An excavation carried down between recent burials yielded nothing in the way of aboriginal interments or artifacts.

Another mound on the same property, said to be filled with recent burials, was not visited by us.

Mounds near New Madrid, New Madrid County, Mo.

The group of mounds on this famous site near New Madrid, on property of Hon. L. A. Lewis, of that place, was reached by us by tying our steamer about one mile below New Madrid, at the foot of Church road, and following this highway about 1.5 mile inland, where the mounds are in full view.

The group consists of a large mound and, all in sight from one another, a small mound of the domiciliary class, presumably, only a few yards from the large mound, and eight remainders of mounds with circular bases, in a field in whose cultivation they are included. This field borders the two larger mounds which have not been under cultivation.

The principal mound, originally quadrilateral, no doubt, whose sides about face the cardinal points, is somewhat more than 17 feet in height. Its diameters of base are, N. and S., 255 feet, and 200 feet E. and W. The diameters of the summit-plateau, in the same directions, respectively, are 170 feet and 120 feet.

The neighboring domiciliary mound is 7 feet in height. Its sides are greatly worn and its basal measurements would be hard to determine. On its summit-plateau and all over that of the great mound are many modern burials, some of whose head-stones are of very recent date. Digging into these mounds seemed out of the question, and judging from their shape, we suffered but little disappointment at the deprivation.

Across the greater mound a trench had been made about E. and W., the original depth of which cannot now be determined. At present it is about 5 feet deep. It is said to have been made in 1858 with the aid of slaves driving mules hauling scoops, and that enough pots were found "to fill a museum." The soil around the mound (itself of clay) is sandy and readily prodded and dug, and we are strongly of the opinion that collections of pottery taken from cemeteries in the level ground, and perhaps from the low mounds of the group, have been, in the course of years, credited to the large mound.

We learn that for years the site has yielded nothing in the way of Indian relics during its extensive cultivation.

In spite of the plowing in progress during our visit, we arranged to put down some exploratory holes here and there in low remainders of mounds and in a ridge forming part of the site, but found neither bone nor artifact. Doubtless the furor for pot-hunting at this place in the past, and constant cultivation since, have completely cleared the site of all the relics it formerly contained.

The settlement of New Madrid is particularly mentioned by Major Forman,[1] who went down the Ohio and Mississippi in 1789–90. At that time there was danger from the Indians along the Ohio. From New Madrid, Mo., to Bayou Pierre, sixty miles above Natchez, Miss., was no settlement along the Mississippi.

Shortly before reaching New Madrid, Major Forman had guests at dinner on his boat and had provided a large piece of fresh beef, "enough and to spare." Three Indians who had come aboard were invited to share the repast, which they no doubt appreciated. At the close of the meal one of the guests, perhaps enlivened by some stimulant, though Major Forman does not say so, took his fork and pitched it in a way to take hold and stand upright in the meat that was left. The Indians, always prone to ceremony and no doubt considering this a ceremonial act incumbent on well-bred persons after a repast, and not wishing to be wanting in courtesy to their host, each hurled his fork into the meat, leaving it planted therein.

The Campbell Mound, Fulton County, Ky.

About six miles westward from Hickman, Ky., on the property of Mr. T. M. French of that place, is the Campbell mound. This mound, formerly quadrilateral with a summit-plateau, is 18 feet in height and 225 feet by 160 feet in diameters of base. The remains of a causeway, now largely plowed away, is evident on one side of the mound. As this mound is a refuge in time of flood, the tenant on the property was not willing to have trial-holes put down in the summit-plateau, where the soil seemed dark and there might have been superficial burials.

Near the mound were two slight rises of very restricted area in the cultivated field in which the mound stands. We were permitted to put down eight trial-holes in these, five of which, in one of them, yielded nothing.

The remaining three holes, dug into the other rise, came upon two burials, as follows:

Burial No. 1, 2 feet 4 inches from the surface, was a deposit of calcined fragments of human bones, roughly circular, about 1 foot 3 inches in diameter and 5 inches in thickness. With these were fragments of sheet-copper showing the effect of fire, presumably parts of an ornament.

This deposit of cremated bones had been placed on a fragment of a very large vessel of earthenware. In places on this large sherd other fragments of pottery had been deposited, making, here and there, a double thickness.

[1] Narrative of a Journey down the Ohio and Mississippi in 1789–90. By Maj. Samuel S. Forman. Cincinnati, 1888.

Nine inches below the pottery was the bottom of a concave fire-place on which was charcoal. The surrounding earth showed the effect of fire. Here and there in the soil between the base of the fire-place and the large fragment of earthenware above it, were fragments of calcined bone, but far too few in number to be termed a deposit. It seemed as if the cremation might have taken place on the fire-place and the fragments of calcined bones been gathered and placed in the pottery receptacle, leaving some of them still scattered in the ground.

Burial No. 2, 3 feet 2 inches deep, was a bunched burial composed of the bones of one skeleton. Alongside this burial was an undecorated vessel of lenticular shape, possibly a rude attempt at a shell-form. In this vessel were some fragments of bones having belonged to a young infant. The vessel, however, was far too small to have contained the skeleton of even so young an infant as the bones found would indicate, and cannot be considered to have been an urn-burial. The remaining bones were not found, and we think it likely that the skeleton of the infant, with the exception of such parts as may have fallen into the vessel, was cut away when the bunched burial was interred, the infant's burial, in this event, of course, having preceded the other.

In the soil near the surface, apart from human remains, was a large fragment of a vessel, the remainder of which apparently had been plowed away. This vessel, originally a bottle, the body consisting of four lobes, had been coated with red pigment. This is the farthest north that we have found earthenware giving evidence of such excellence of design and coloring.

Mounds on Pinhook Ridge, Mississippi County, Mo.

On Pinhook Ridge, on the western side of Teefo Pond (we spell the name as it is locally pronounced), drained by Pinhook Bayou, about three miles in a straight line WNW. from the lower end of Wolf Island chute, is a group of five mounds. These mounds, forming an irregular circle, are on the property of Mr. W. C. Russell, of Charleston, Mo.

Mound A, the largest of the group, oblong with extensive summit-plateau, has been frequently used for protection of stock in times of overflow. Height, 18.5 feet; length and width of base, respectively, 239 feet and 181 feet.

Mound B, 25 yards S. from Mound A, oblong with rounded corners, has been under cultivation for a number of years. Height, 6.5 feet; length of base, 152 feet; width of base, 122 feet. Trial-holes in the summit-plateau were without return.

Mound C, also oblong with summit-plateau, 60 yards SE. from Mound B, had been under cultivation. Height, 5 feet; length and width of base, respectively, 131 feet and 114 feet. A number of trial-holes yielded only a small, undecorated bowl of coarse ware, having two holes together on two opposite sides for suspension.

Mound D, 75 yards NE. from Mound C, circular as to the base and probably

originally without summit-plateau, though recent use has caused some flattening. Height, 14.5 feet; diameter of base, 90 feet.

Mound E, 22 yards NW. from Mound D and 90 yards E. by S. from Mound A. Height, 7 feet; diameter of the circular base, 87 feet. The presence of buildings on this mound prevented investigation.

Extending from the side of Mound E in a NW. direction is an irregular ridge about 270 feet long, 102 feet wide, having a maximum altitude of 6 feet, almost entirely covered with buildings.

Trial-holes put down in various parts of the area surrounding the mounds failed to find artifact or burial.

Mound on the Chaney Place, Hickman County, Ky.

About two miles in a straight line eastwardly from the lower end of Wolf Island, near Little Obion river, on property of Mr. J. W. Chaney, living upon it, is a mound with summit-plateau in which are numerous burials of recent date. Height, 11 feet 4 inches; diameters of base, 120 feet and 135 feet.

Mounds on the Turk Place, Ballard County, Ky.

On the estate of the late Mr. J. W. Turk, Bardwell, Ky., about 1.5 mile in an easterly direction from the lower end of Island No. 1, are three mounds which were courteously placed at our disposal by Mrs. Turk. These mounds have been plowed over for a number of years and are considerably modified in shape.

Mound A, westernmost, running about N. and S., has a flat top and is somewhat less than 11 feet in height. Its basal measurements are: length, 182 feet; width, 134 feet. The plateau in the same directions is 115 feet and 64 feet.

Mound B, of which the western end almost adjoins the northern end of Mound A, extends about east and west and consists apparently of two mounds united by a ridge slightly lower than the mounds themselves, which are entirely distinct from Mound A. The basal length of the mound, that is to say the ridge and its two extremities, is 283 feet; the width of the western end, 104 feet; that of the eastern end, 120 feet. The dimensions of the summit-plateau in corresponding directions, respectively, are 200 feet, 36 feet, and 40 feet. The height of the eastern end is 8 feet, and that of the western end, 13 feet.

Mound C, about 36 yards east of Mound B, is 36 feet across its circular base; its height is about 6 feet, though its base, the original surface of the ground, was but 4 feet from the summit of the mound.

A central excavation 12 feet square was carried to the base of this mound. Eighteen inches down were fragments of an object of wood copper-coated, whose original shape is not determinable.

About 1.5 foot distant from this object, with no bones in association, though of course a burial may have been there, were the fragments of an undecorated water-bottle with wide mouth. Apparently originally inverted in the mouth

of this bottle was a small, undecorated bottle having a neck in the form of a truncated cone. The ware of both these bottles, which was without shell-tempering, was of fair quality and had borne a high polish originally.

About 20 inches down in another part of the excavation was a burial extended on the back.

In the field surrounding the mounds are humps and ridges that have been plowed over for a long period. Trial-holes in these came upon midden debris but no burials.

At the Turk Place we obtained from a boy who said he had found them together on the Allen Place nearby, three implements of flint, probably hoes. These objects, the longest of which is about 8 75 inches, the others slightly less, are each about 3.25 inches in width, have rounded, unground edges, and are without the polish that one sometimes observes on flint implements that have seen use in cultivation of the soil. All are on one face flat transversely, somewhat concave longitudinally, and on the other face convex transversely and longitudinally—a shape fitted readily to enter and displace the soil.

Mounds on the Edwards Place, Ballard County, Ky.

About one mile east from the head of Island No. 1 and from the mouth of Mayfield creek, on high table-land, on property of Mr. J. P. Edwards, who lives on the extensive estate, are two mounds of clay but a few feet apart, the larger 62 feet across its circular base, with a height of 6 feet 3 inches.

An excavation 12 feet square showed the former surface of the ground to be but 5 feet 2 inches below the top of the mound. No burial was encountered in the body of the mound, but commencing at the dark base-line was an oblong grave-pit 8 feet 2 inches by 3 feet 6 inches in size, extending 3 feet 3 inches into the hard, underlying clay.

Every part of the contents of this grave was carefully removed with a trowel without the discovery of any artifact or bone—not even so much as the crown of a human tooth. The grave, cut into dense clay, had served as a tank, holding moisture, its contents being mud while the remainder of the mound and the surrounding underlying clay was solid. Probably long-continued wet had aided in the complete destruction, through decay of the skeleton which the grave at one time must have contained.

A hole 12 feet square, sunk in the smaller mound, which was less than 2 feet in height and about 50 feet in diameter, yielded no return.

A low mound much plowed away on another part of the Edwards Place was carefully dug into by us, but seemed to have been built as a place of domicile. In the soil was what probably had been the handle of a tool. This object is of antler, hollowed at one end as if for use as an arrowhead, but greatly curved at the other end.

In a field adjoining the Edwards Place, having some fragments of flint on the surface, a number of holes failed to find burials, but came upon, in one in-

stance, a handsome celt of flint, nearly flat on one side, convex on the other, having a gracefully rounded cutting edge, highly polished on each side. Length 6 inches.

Aboriginal Dwelling-Site at Wickliffe, Ballard County, Ky.

This site, locally celebrated, is at the town of Wickliffe, the property of the Wisconsin Chair Co., of Port Washington, Wis. Careful digging over this site failed to find artifact or burial, though there is history of objects having been found there.

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A Form of Urn-burial on Mobile Bay. American Anthropologist, Jan.-March, 1905.

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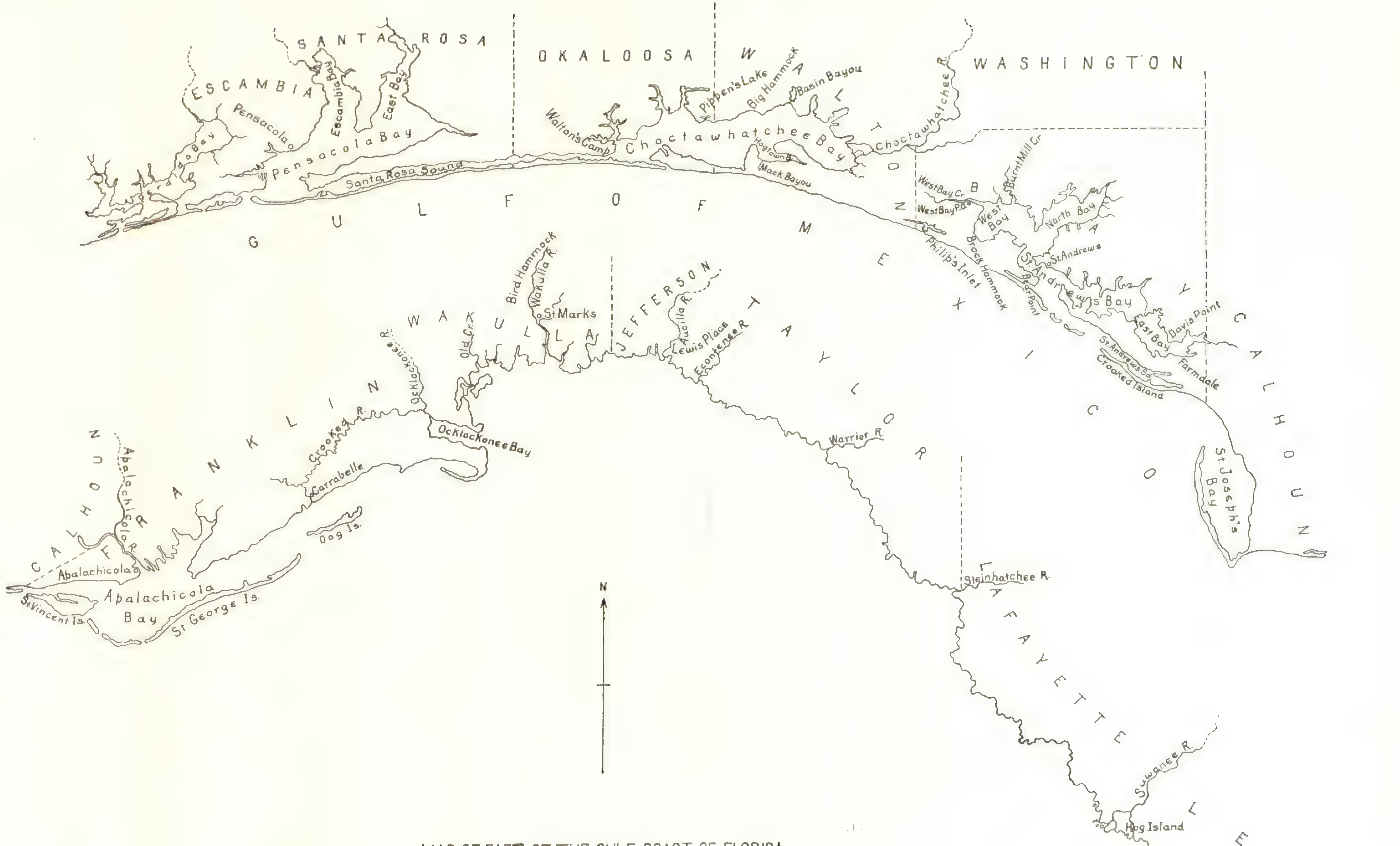
The Northwestern Florida Coast Revisited

BY

CLARENCE B. MOORE

PHILADELPHIA
1918



MAP OF PART OF THE GULF COAST OF FLORIDA

Scale in miles

0 5 10 20 30 40 50

1918

THE NORTHWESTERN FLORIDA COAST REVISITED.

By Clarence B. Moore.

INTRODUCTION.

The end of our work along Green river, Kentucky, in 1916, virtually completed for us the list of all rivers navigable by our steamer, and at the same time not likely to be affected by ice in winter (in summer cultivation bars effective search), to be found in southeastern United States. In addition, all the coast of the same region, navigable to us, had been carefully investigated by our expeditions extending over a period of about twenty-seven seasons.[1]

One river, the Choctawhatchee, in Alabama and northwestern Florida, opened to navigation since our latest visit to the region drained by it, by the removal of a bar at its mouth and by the uprooting of a multitude of snags from its bed, remained uninvestigated, and this stream we determined to search, and, in addition, for the second[2] time carefully to cover the northwestern Florida coast, impelled thereto by reasons which we shall proceed to explain.

It may be well to say here, to any not familiar with the archæology of Florida, that it was an aboriginal custom there often practised, to "kill" a vessel to be interred with the dead, by breaking a hole in its base, thus freeing its soul[3] to accompany that of its owner to the life beyond.

Doubtless some of the more thrifty among the aborigines regretted this

[1] Two additional seasons of exploration detailed in this report bring the total to twenty-nine.

[2] As to our first visit (1901 and 1902) consult "Certain Aboriginal Remains of the Northwest Florida Coast, Parts I and II." Journ. Acad. Nat. Sci. Phila., vols. XI and XII.

[3] We are indebted to Col. G. E. Laidlaw for the following references as to the Eskimo, which are interesting for comparison.

Geological Survey, Ottawa, Canada, Memoir 91, Number 14, Anthropological Series. "The Labrador Eskimo," by E. W. Hawkes.

"The small specimen [a stone kettle], which came from an old grave, has two holes bored in the bottom. All lamps and kettles placed on graves were treated in like manner, to liberate the *inua* of the utensil and allow its use by the shade of the owner, in the other world." Page 90.

"On top of the grave are laid the effects of the deceased, . . . All the effects of the deceased are broken to liberate the spirit residing there, so that it may be useful to the shade of the owner. The clothes are torn; the dishes split; and holes bored in the soapstone lamps and kettles." Page 120.

"The Eskimo believe that not only all animals but also any prominent physiographical feature, such as a rock, point, cove, or mountain, is inhabited by a spiritual counterpart, the *inua*, the genius or thinking spirit of the object or spot. This is the third person possessive form of *inuk*, man, and means literally 'its man,' which perhaps expresses the idea as well as it can be explained." Page 127.

It may be worth while also to cite here one of the many accounts of mortuary mutilation of objects placed with the dead in Africa.

The Ekoi of Western Africa erect little funeral shrines over the graves of persons of distinction. "Round these are scattered various pieces of property, such as plates, dishes, etc., all broken. . . .

"The things scattered round are broken so that their astral forms may be set free, to be borne by the shade of their owner into the spirit world." "In the Shadow of the Bush," P. Amaury Talbot, London, 1912, page 6 *et seq.*

expenditure of serviceable pottery and hence arose a refinement of the custom, widespread in Florida and met with by us at one place even in western Louisiana,[1] namely, the manufacture of mortuary vessels otherwise useless, of inferior ware as a rule and having a basal perforation made previous to the firing of the clay.

Probably through this class a further evolution is found (along part[2] of the northwestern Florida coast and its hinterland, including some mounds on the Apalachicola,[3] Chattahoochee and Flint rivers[3]), namely, the "openwork" vessel, having ready-made excisions in the body of the vessel, which often formed parts of the decoration. Vessels of this class, first discovered by the expeditions of the Academy of Natural Sciences and described in the Journal of the Academy, are to be seen, at the present writing (1917), in no other institution, we believe.

The desire to obtain other examples of this class of ware and the added hope to discover more of another class, namely, those superb bowls forming a part of the urn-burials found mostly to the westward[4] of the locale of the openwork ware, were the motives suggesting to us a second visit to the northwestern Florida coast. In this purpose we were encouraged by the knowledge that the population there had greatly increased in number since the period of our first visit, and that the consequent spread of cultivation in places hitherto unreclaimed, must have brought to the attention of inhabitants mounds, even though small (for we were convinced we had investigated all the large ones), as to which we could learn by inquiry.

A feature in the archæology of the northwestern coast of Florida, in addition to that of the ceremonial "killing" of pottery, is that almost without exception a deposit of earthenware is found in the eastern part of the mounds, and that little else was put by the aborigines in the way of a ceremonial deposit, elsewhere in the mound or individually with the dead.

This custom inured to our benefit, for treasure-seekers and diggers from the neighborhood of the mounds usually contented themselves with a hole in the central part and presumably rarely obtained more than the physical benefit derived from outdoor exercise.

Mr. F. W. Hodge, on the eve of his departure for field work in New Mexico, has sent the following note: "Cushing in his paper on the work of the Hemenway Expedition, published in the Proceedings of the VII International Congress of Americanists held at Berlin in 1888 and published in 1890 [page 172], refers to the 'killing' of pottery vessels by the ancient inhabitants of the Salt River Valley, Arizona.

"The same custom was practised also by the ancients of the Mimbres Valley in New Mexico, as described by Fewkes in a paper published by the Smithsonian Institution three or four years ago.

"The mortuary vessels unearthed by me at the ruins of the pueblo of Hawikuh, near Zuñi, last summer were killed by being thrown into the graves and thus broken to pieces."

[1] Lake Larto, Catahoula Parish. "Some Aboriginal Sites in Louisiana and in Arkansas." Journ. Acad. Nat. Sci. Phila., vol. XVI.

[2] From the western extremity of St. Andrews Bay to the Warrior River, inclusive.

[3] "Certain Aboriginal Mounds of the Central Florida West-Coast; Certain Aboriginal Mounds of the Apalachicola River." Journ. Acad. Nat. Sci. Phila., vol. XII.

"Moundville Revisited; Crystal River Revisited; Mounds of the lower Chattahoochee and lower Flint Rivers." Journ. Acad. Nat. Sci. Phila., vol. XIII.

[4] Choctawhatchee Bay, Santa Rosa Sound, Perdido Bay. "Certain Aboriginal Remains of the Northwest Florida Coast, Part I."

Of our season of 1916–1917, some days of November and December, 1916, and of January, 1917, we devoted to archæological research among sites near Golden Lake, Ark., about thirty-five miles above Memphis, Tenn. The remainder of January and part of February, 1917, were consumed in reaching Florida and in visiting *en route* down Mississippi river certain sites that we hoped might prove of interest. Notes as to this work on Mississippi river form the concluding part of this report.

The remainder of the season (more than two months) was spent in the investigation of Choctawhatchee Bay, Florida, and Choctawhatchee river and tributary streams, Florida and Alabama.

In the autumn of 1917 and the winter and part of the spring of 1918 the expedition investigated, for the second time, the Apalachicola river and Flint river to Bainbridge, Georgia, and continued its work down the Florida coast, from St. Andrews bay to Crystal river, somewhat below Cedar Keys, inclusive.

In advance of our coming, as usual, search was made by Mr. J. S. Raybon, for many years captain of our steamer, with a companion, along Choctawhatchee river from Pate Landing, Alabama, to Choctawhatchee bay, Florida, into which the river empties, a distance of 122 measured miles by water, and in addition 27 miles along Holmes river to the end of navigation on it. Captain Raybon also covered for the second time (a search by him having preceded our first visit) the northwestern coast of Florida from Pensacola to Cedar Keys. In this way knowledge as to additional sites and permission to investigate them were obtained by us prior to our visit, a great saving in time.

Choctawhatchee river has its source in southeastern Alabama, pursues a southerly course into northwestern Florida, and continuing southerly and southwesterly about 94 miles enters the eastern end of Choctawhatchee bay, as stated.

This stream was investigated by us as far up as Pate Landing, Ala. In addition, Holmes river, an affluent, was searched about 20 miles up by us.

Choctawhatchee river, as it had been reported to us as likely to be, proved unproductive from an archæological point of view. The banks, mostly low-lying, are wooded, habitations being rarely visible from the water, all of which tended to make it extremely difficult to obtain information as to the whereabouts of the few small mounds that seem to be the only kind along the stream.

All mounds visited by us along Choctawhatchee river and on the northwestern Florida coast were of sand, unless otherwise described.

Our thanks are tendered Dr. M. G. Miller, who accompanied the expedition as anatomist during the past two seasons, as he has done throughout all our archæological work in the South, and has aided in preparing this report and in putting it through the press.

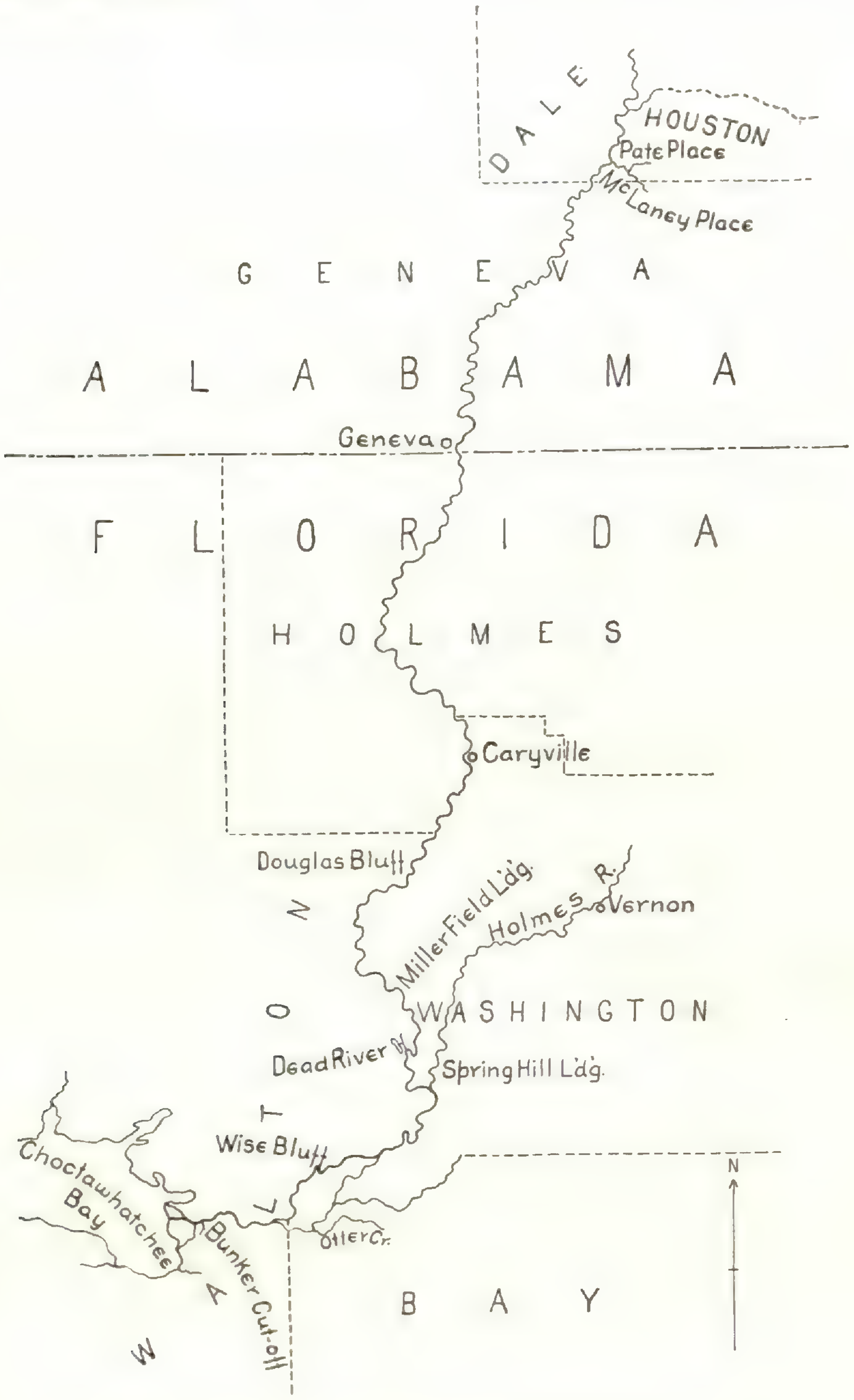
Also we wish to return thanks to Mr. L. B. Smiley, who lent efficient aid as general assistant during part of our investigation.

The warmest thanks of the Academy are extended to the numerous owners of mounds and sites along our line of work, who so courteously placed them at its disposal.

The Academy also desires to express its obligation to Dr. H. F. Keller for chemical determinations, to Mr. F. W. Hodge for literary revision of this report, and to Miss H. Newell Wardle for assistance with the index.

Measurements in this report are approximate; reductions are linear.

All objects of any importance found by us between St. Andrews bay and Crystal river, inclusive, have been presented to the Museum of the American Indian, Heye Foundation, New York, our Academy having a very comprehensive collection from this region.



MAP OF PART OF CHOCTAWHATCHEE RIVER

SOME ABORIGINAL MOUNDS ON CHOCTAWHATCHEE RIVER.

Mounds Investigated.[1]

(The mounds are given in order going up-stream.)
Mound near Bunker Cut-off, Walton County, Florida.
Mound near Otter Creek, Bay County, Florida.
Mound near Wise Bluff, Walton County, Florida.
Mound near Spring Hill Landing, Washington County, Florida.
Mounds near Dead River, Walton County, Florida.
Mound near Miller Field Landing, Washington County, Florida.
Mound near Douglas Bluff, Walton County, Florida.
Mound on the McLaney Place, Houston County, Alabama
Mounds on the Pate Place, Houston County, Alabama.

Mound near Bunker Cut-off, Walton County, Florida.

The property of Mr. J. W. Windsor, resident on it formerly belonging to Mr. G. W. Lee, may be reached by going up Choctawhatchee river about three miles to Bunker cut-off, another mouth of the river, and continuing one-quarter mile, approximately, down the cut-off. On this property, in pine woods, was a mound of circular outline, 43 feet in diameter of base and 3 feet 8 inches high. The mound probably had been considerably spread by wear and by wash of rain, and doubtless in the past had a greater height and a less extended base.

The mound was entirely dug down by us, great care being taken closely to observe the base which, no doubt the original surface, was one foot in thickness and much darker than the sand of the mound. It overlay undisturbed yellow sand having a slight admixture of clay.

An excavation about 6 feet in diameter had been put down centrally in the mound by digging previous to ours, the sand filling the hole containing fragments of human bones.

In the sand thrown back by our men in the demolition of the mound were: fragments of flint; a pitted hammer-stone; a large iron spike; a rude arrowhead or knife, of flint; an object of limestone, perhaps a knife, nearly semilunar in outline but having one end sharpened as for insertion in a handle; a number of sherds. These sherds, some from vessels of considerable size, show in one instance the small check-stamp, and in others incised designs similar to those figured[2] by us as on earthenware coming from cemeteries along the Florida coast between Perdido bay and Choctawhatchee river. One sherd with a graceful line decoration is shown in Fig. 1.

[1] Between Douglas Bluff and the town of Caryville, 13 miles following the course of the stream, high water prevailing at the time of our visit prevented investigation of several low mounds and rises.
Between Caryville and Geneva, Ala., 29 miles by water, no mounds were seen or heard of by our agents or by ourselves.

[2] See "Certain Aboriginal Remains of the Northwest Florida Coast, Part I." Journ. Acad. Nat. Sci. Phila., vol. XI.

No burials were encountered by us until the central part of the mound had been reached, where, from the upper surface of the basal layer to the surface of the mound, the depth was 3 feet. Twenty-six inches down were the decayed remains of a small, bunched burial represented by fragments of a skull, of a femur, and of a humerus. Near them was a discoidal stone of silicious rock, 3 inches in diameter. This stone is of the truncated-cone variety and could not have been used to roll in the game of chungkee.

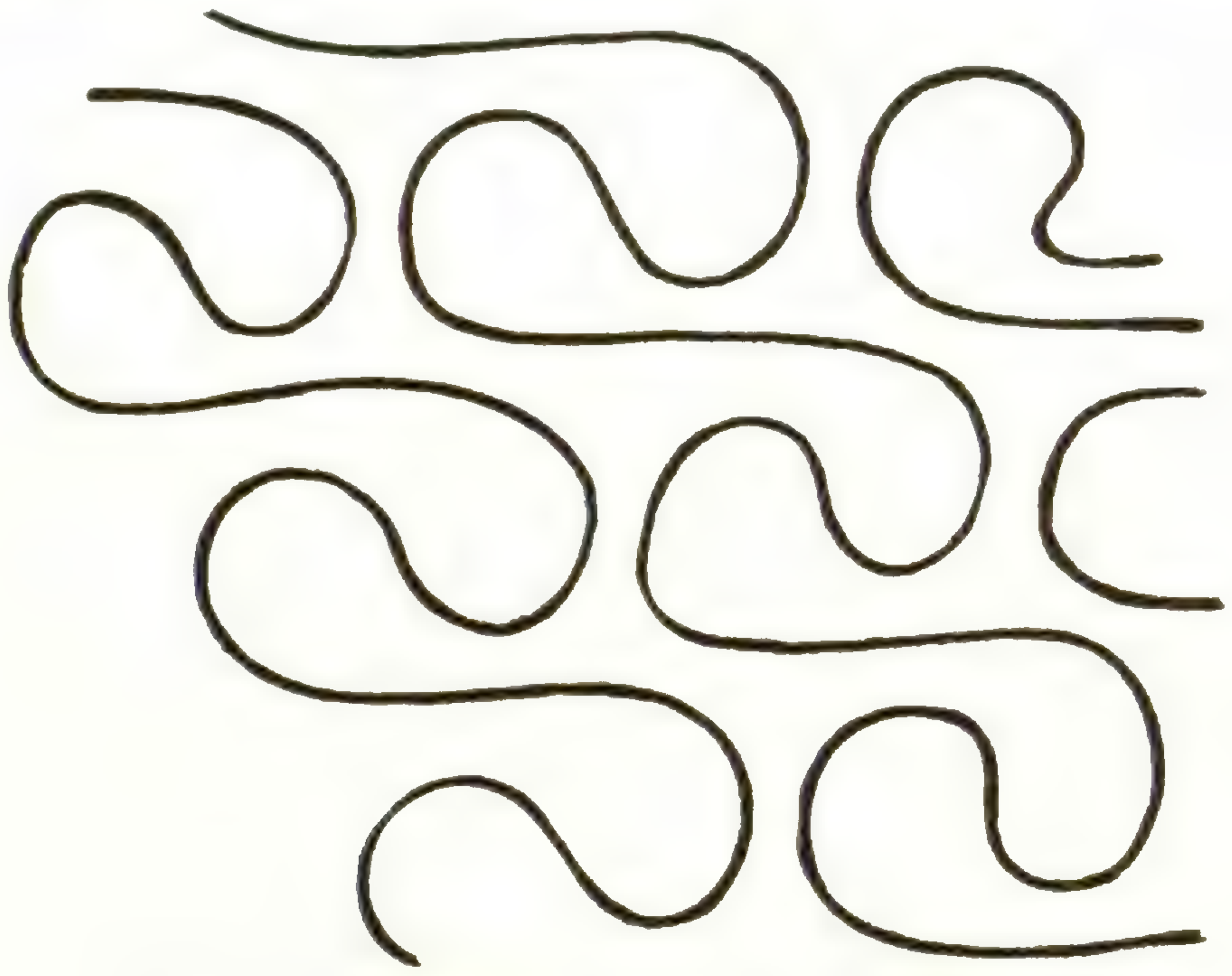


FIG. 1.—Decoration on sherd. (Full size.)

About 3 feet distant from the preceding burial, at the same level, was a more extensive bunch, decayed remains of one skeleton including skull, ribs, vertebræ, humeri, bones of the forearms, pelvis, femora.

At depths of 10 inches and 18 inches, respectively, were decaying remains of small bunched burials, and 28 inches and 30 inches down were traces of single skulls, with one being a biconical pipe of earthenware, having a small part missing. On the bowl still remain traces of a uniform coating of red paint.

Approaching the central part of the base was a group of three grave-pits near together, probably all that had been in the mound, as the previous digging did not extend to the depth reached by the pits in question.

One of these pits, 34 inches by 40 inches where it cut through the basal layer, extended 3 feet into the undisturbed, yellow sand, having a slight admixture of clay, which underlay the mound. This pit became somewhat conical and ended in a base roughly circular with a diameter of about 22 inches. The grave had been filled with a mixture of the sand of the basal layer and of the underlying sand from the grave, and was readily distinguishable.

Thirteen inches down in the pit were the remains of a skull, with fragments of pottery, mostly undecorated, scattered below it, and continuing to the bottom of the pit. No complete vessel was represented by these sherds.

The second grave-pit, 3 feet by 4 feet, and extending 32 inches below the base

of the mound, maintained its oblong shape to the bottom with great regularity, though slanting inward somewhat, its basal dimensions being 22 inches by 45 inches. No trace of bone was discovered in this grave, but as the material filling it was decidedly moist, a burial formerly in it unquestionably had decayed away.

The third grave, 34 inches by 55 inches, extending 27 inches below the base of the mound, resembled the second one in the regularity of its shape; the dimensions of its base were 23 inches by 4 feet. No trace of bones was present in it.

Mound near Otter Creek, Bay County, Florida.

This mound, in pine woods, on property belonging to Miss Minnie Anderson, of High Point, N. C., was reached by going about 4 miles up East river (a division of the Choctawhatchee) to its union with Otter creek, and then continuing about three miles up the creek to a landing on the south side and walking inland about one-half mile, in an easterly direction.

The mound, much spread apparently, 4 feet in height and 75 feet in diameter, had centrally a hole about 6 feet by 10 feet which had been put down between the time of the visit of our agent and our own. Residents in the neighborhood who said they had been present when the hole was dug, asserted that nothing had been found.

The mound had all the appearance of being a domiciliary one. It was trenched and dug into in a number of places by us without encountering bone or artifact.

Mound near Wise Bluff, Walton County, Florida.

In a cultivated field, on the property of Mr. Robert Bozeman, at Wise Bluff, resident on the place, was the remainder of a mound much spread by cultivation, which, we were told, had been considerably dug into without success. Fragments of human bones, however, were on the surface.

This remainder, 2.5 feet in height and 38 feet in diameter, was entirely dug down by us. The remains of a skull and a few long-bones together, traces of skulls in three places, one in a hole made and refilled by previous digging, were encountered in different parts of the mound.

With one of the skulls had been most of an undecorated pot in fragments, 1.5 foot from which was another pot having a part missing, bearing a complicated stamp carelessly applied.

Almost exactly in the eastern part of the mound, 6 to 8 inches below the surface when dug by us, was the ceremonial deposit of pottery usually encountered in mounds in this region. This deposit consisted of fragments of various vessels, some plain, some with pinched decoration, one having a punctate and line design, and one a complicated stamp.

With these were two vessels, one diminutive, decorated on the upper half of the body with diagonal, parallel, incised lines; the other carefully made, having the same kind of decoration and a rim effective in appearance, som what flaring

and sloping upward gradually at three equidistant points. At one of these a missing part has since been restored. This vessel, shown in Fig. 2, has a basal

Fig. 2.—Vessel of earthenware. Mound at Wise Bluff. (Height 4.8 inches.)

perforation, as have all but one found at this place which were sufficiently whole for determination.

Through the side of the vessel in question is an even, round hole equaling a lead pencil in diameter and resembling a perforation made by a sounding-rod, though it can hardly be such, as these rods are not known to have been used on this river, and the vessel, when found, was upright and could not, when in the mound, have been evenly pierced through the side by such an appliance.

Mound near Spring Hill Landing, Washington County, Florida.

About one-half mile southeast by east from Spring Hill Landing, on Holmes river, an affluent of the Choctawhatchee, on the property either of the J. P. Williams Land Co. of Tallahassee, Fla., or of the R. E. L. McCaskill Co. of De Funiak Springs, in the same state, is a mound about 5 feet high and 33 feet in diameter. Persons living near the mound informed us that the land of these companies adjoined and that residents there were unable to say on which side of the line the mound stood.

The mound, in an old field, though plainly the eminence never had been plowed over, was a truncated cone and symmetrical, though previous diggers had put down a hole centrally in it 4.5 feet by 12 feet—probably getting a few fragments of bones for their pains. The mound was completely dug through by us.

Six burials, all single skulls save in one instance where probably two had been interred together, as they were but 4 inches apart, lay in the eastern side of the mound, but not with the mortuary deposit of pottery, all being away from it and at higher levels. With some of the skulls were a few fragments of other bones.

Several bits of mica lay apart in the mound, as did the remains of a large marine shell that probably had been a drinking-cup.

About due east, in the margin of the mound, the usual mortuary deposit began and extended in, on or near the base, a total distance of about 13 feet. Its width at first was approximately 4 feet, and it was composed of mingled fragments of different vessels of ordinary form and commonplace decoration, evidently intentionally spread to occupy space. With these, here and there, were a few vessels, probably whole or nearly whole when interred, but in fragments lying together in place when found.

Following this part of the deposit, which extended in 4.5 feet, was a gap of about one foot and then the deposit commenced again, having about the same width, with eight vessels, some fairly large, all upright originally and but short distances apart. Most of these vessels were badly crushed.

Following these came vessels entire or nearly so, vessels in fragments and numerous sherds, the deposit continuing to the end in diminishing width.

In this latter part of the deposit were some fragments of large marine shells and considerable charcoal.

The pottery found at this place presents little of interest, most of the vessels being of ordinary form and without decoration. Some bear imprints of a thumb-nail or of the section of a reed (perhaps both in different instances), some have incised line decoration of a simple pattern. All the vessels were found to have the mortuary perforation when sufficient parts were obtained for determination.

A small bowl is decorated with crimson pigment interiorly. Another bowl, 13.8 inches in diameter, found entire, has an incised decoration, shown in diagram in Fig. 3, appearing twice in the circumference of the vessel.

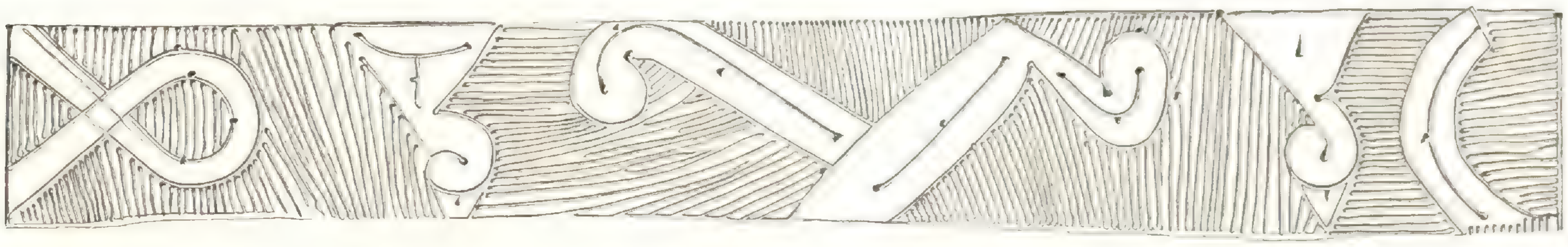


Fig. 3.—Decoration. (One-third size.)

A bowl of excellent ware, broken when found but now having the parts cemented together, is shown in Fig. 4.

Mounds near Dead River, Walton County, Florida.

Dead river, a former course of the Choctawhatchee, joins it 33 miles above the mouth of that stream. Going up Dead river about one mile one comes to a

landing on the left-hand side, near which is the property of the R. E. L. McCaskill Co. of DeFuniak Springs, Fla., to which we are indebted for permission to explore its numerous properties. About one-eighth mile in a southwesterly direction from the landing, on fallow ground belonging to the company, was a mound 28 feet in diameter, evidently much spread by cultivation. Its height was about 14 inches. This mound was completely dug through by us.

Fig. 4.—Vessel of earthenware. Mound near Spring Hill Landing. (Diameter 6.75 inches.)

In the margin, exactly in the eastern part, was a ceremonial deposit of pottery, the vessels all small or of moderate size, some undecorated, some bearing the check stamp or a scanty, incised, line decoration. Three vessels were entire, while a number of others were more or less largely represented by broken parts. With this deposit was the crown of a human tooth, an indication of a burial.

In two other instances in this mound burials were found consisting of traces of a skull and other bones. With one of the burials were fragments of charcoal.

About 6 feet from the deposit of pottery was an undecorated bowl somewhat crushed.

About three-quarters of a mile southerly from the first mound, also on fallow land and belonging to the same owner, was another mound, evidently much affected by the plow, 30 feet in diameter and 16 inches in height. This mound was entirely demolished by us. In the margin and almost due east in the mound was a small, undecorated pot.

Northeasterly in the mound were a skull and parts of other bones, 1.5 foot distant from which were four pots together, the largest 7 inches in height and 5.5 inches in maximum diameter. These are of rather inferior ware, one undecorated, one having incised lines below the opening, two with encircling bands of

decoration—one a complicated stamp, the other lines of pinched markings near the aperture. Five feet from this deposit were two pots, one decorated with two parallel, encircling lines, the other having a simple punctate design. These had suffered the usual ceremonial breaking of the base, as had all the vessels from this place of which sufficient parts were recovered to permit determination.

Still in the eastern part of the mound, but farther in, perhaps a continuation of the deposit, were three vessels some distance apart, two undecorated, one having below the opening a band filled in with a complicated stamp. Two of these vessels, like most of the others from this place, were found to have parts missing, probably breakage sustained in household use which impaired the value of the vessels and made them especially fitted for mortuary deposit. With these receptacles was a small mass of galena, largely oxidized into sulphate and carbonate of lead.

Three burials were encountered, all in the eastern part of the mound, each consisting of fragments of a single skull and of various other bones. With one burial were three undecorated pots and the lower part of a toy vessel, also undecorated.

A large fragment belonging to the skull of this burial had an elliptical perforation, evidently old, that might well have been made by a spike-shaped arrowhead, which, however, if such were the case, presumably had been withdrawn before the interment, as nothing of the kind was found in the mound.

Mound near Miller Field Landing, Washington County, Florida.

In pine woods, about one mile southerly from Miller Field Landing, on property of Mr. Fleming Yan, living nearby, was a mound 30 feet in diameter and 2 feet in height, having at the time of our visit an excavation in the central part, 6 feet square, and a trench about 4 feet wide, from the western margin to the center. This remainder of the mound was practically demolished by us.

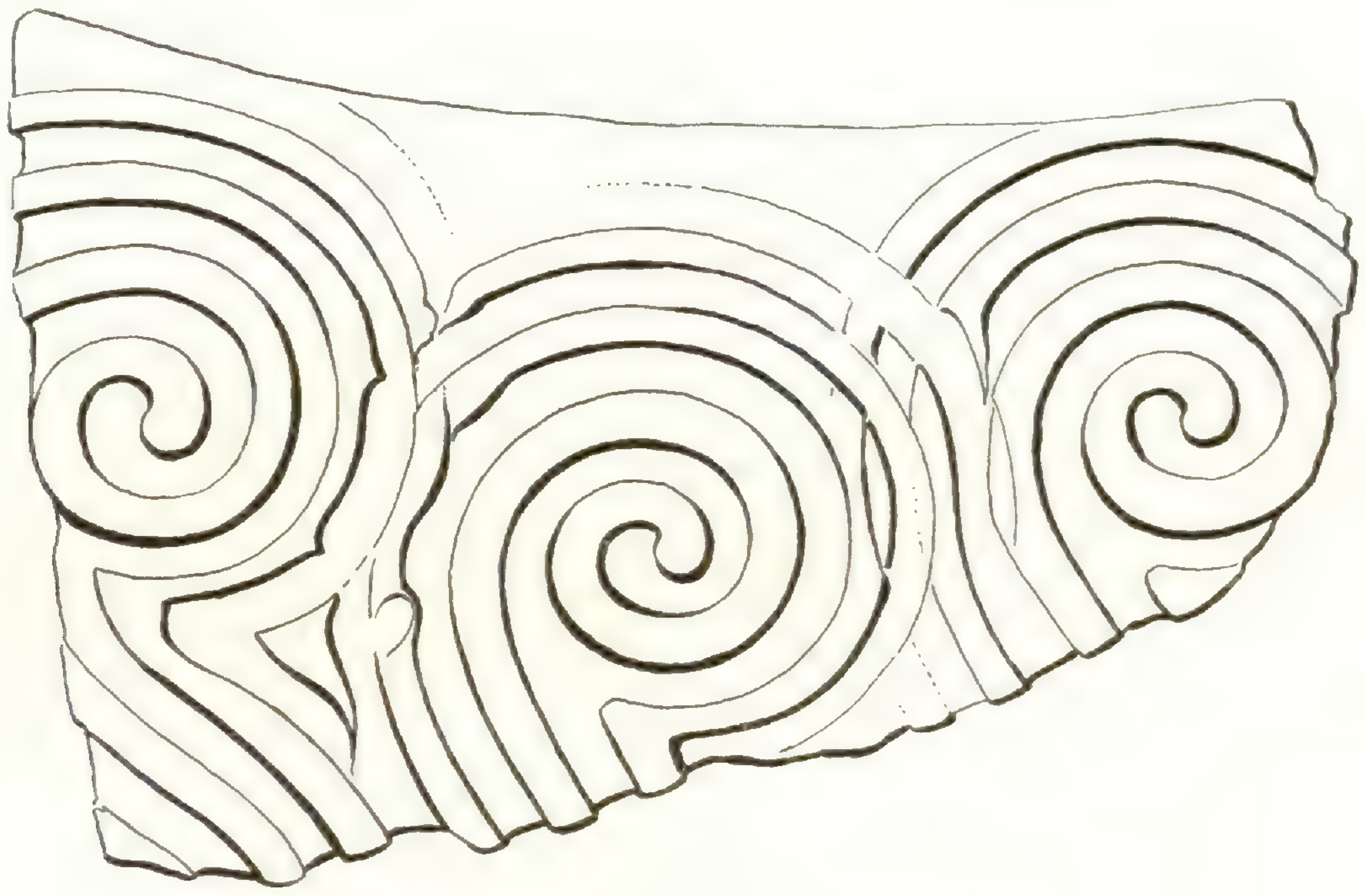


Fig. 5.—Decoration. (Two-thirds size.)

Almost due east in the marginal part of the mound began a deposit of pottery, broadening to a width of about 3 feet and continuing well toward the center. This deposit, not continuous, strictly speaking, included only one vessel that could be said to have been buried entire, and in many instances it was certain that parts only had been put into the mound.

So inferior is the ware that nearly all the deposit was in small fragments. In addition to considerable undecorated ware is one piece having a scanty design composed of incised parallel lines, and a number of others bearing complicated stamp decoration. One of these is shown in Fig. 5.

On the opposite side of the mound, alone, were fragments of most of an undecorated pot.

In the northern part of the mound, somewhat in from the margin but by no means central, was a grave of rather indefinite outline, about 6 feet long and 3 feet 3 inches wide, extending about 3 feet below what we considered to be the base of the mound. This grave contained traces of a considerable quantity of bones, including a skeleton almost at full length, three additional skulls, a small pile of long-bones, and other bones here and there.

Mound near Douglas Bluff, Walton County, Florida.

Douglas Bluff is 54 miles up Choctawhatchee river. About three-eighths mile north from the upper end of Douglas Bluff, in pine woods, partly on property of the R. E. L. McCaskill Co. of DeFuniak Springs, Florida, whose courtesy to

Fig. 6.—Vessel of earthenware. Mound near Douglas Bluff. (Height 5.1 inches.)

the Academy we have had occasion to acknowledge before, and in part on that of a person whose name we did not learn, was a mound through which a trench about 4 feet wide had been dug north and south. The eastern half of this mound, which was 3.5 feet in height and 42 feet in diameter, was dug away by us.

In five places human bones were encountered, three skulls separately, a skull with fragments of other bones, and traces of bones.

The usual mortuary deposit of earthenware, in this instance composed of vessels and parts of vessels, in fragments, a few whole vessels and several entire with the exception of a part, lay away from the burials. With them were the remains of what had been a shell drinking-cup, and in another part of the deposit some small sheets of mica. The deposit was first encountered in the northeastern part of the mound, about 3.5 feet inward from the margin, and, considerably spread and scattered, continued in about 14 feet.

More attempt at decoration on the earthenware (gritty ware in one instance) was present in this mound than we usually found along the Choctawhatchee. This decoration, punctate and incised as a rule, includes the complicated stamp and the small check-stamp only to the extent of several small sherds. In form also a few of the vessels are somewhat out of the ordinary. All determinable are seen to have the mortuary hole knocked through the base.

The following ware is worthy of especial description.

A pot (Fig. 6) having an interesting line and punctate decoration, shown in diagram in Fig. 7. Red pigment, which at one time had considerable part in the decoration of the vessel, is present on much of the surface.

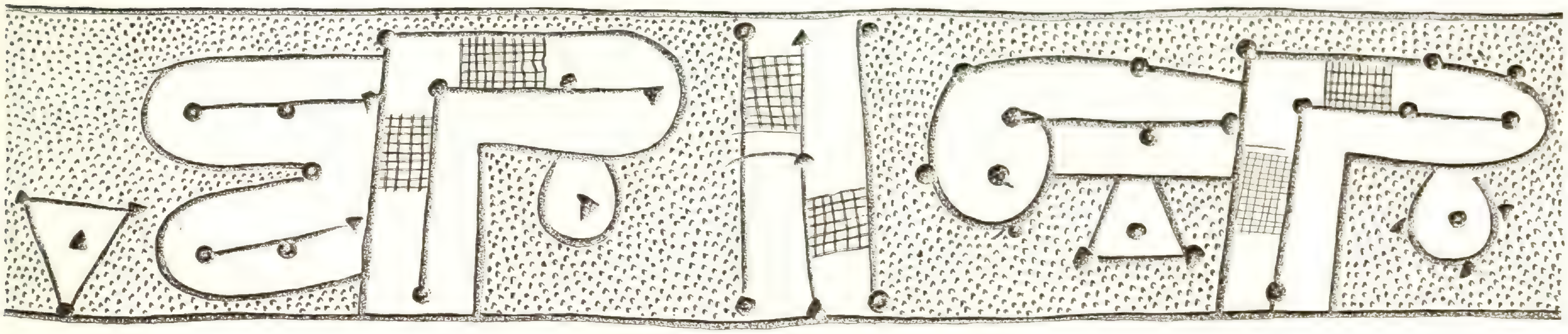


Fig. 7.—Decoration. (Two-thirds size.)

An undecorated, lenticular vessel of good, hard yellow ware is 3.5 inches high and 8 inches in length.

One vessel, of which only part was present in the mound, and this part in many fragments, has had a flattened spherical body and an upright, circular neck, the rim of which projects somewhat at four equidistant points (Fig. 8). The decoration is a line and punctate design.

Part of another vessel, also of excellent yellow ware, found in many fragments,

is shown in Fig. 9. The decoration, deeply marked, includes a variety of crosses surrounding the neck.

A decoration on part of another vessel is shown in diagram in Fig. 10.

Fig. 8.—Vessel of earthenware. Mound near Douglas Bluff. (Height 8.5 inches.)

Mound on the McLaney Place, Houston County, Alabama.

One mile below Pate Landing is a bluff on the east side of the river. One-half mile east, approximately, from this bluff, on hammock land, is a mound on the property of Mr. H. C. McLaney, living nearby. This mound, symmetrical and having sustained but little previous digging, was 4 feet 10 inches in height and 33 feet in diameter of base. It was completely dug away by us with the exception of a marginal part on one side, mostly surrounding a tree.

2

1

1. MOUND ON THE McLANEY PLACE, VESSEL OF EARTHENWARE. (FULL SIZE.)

2. MOUND NEAR PIPPEN'S LAKE, VESSEL NO. 7. (FULL SIZE.)

About 3 feet in from the margin, in the east northeastern part of the mound, was seemingly the ceremonial deposit of pottery, though the makers of the mound had not imposed on themselves any great sacrifice of earthenware vessels. To-

FIG. 9.—Vessel of earthenware. Mound near Douglas Bluff. (Height 6 inches.)

gether were an undecorated vessel, badly broken; some fragments of another vessel having a rude decoration; and what had been an imitation of a gourd, with line decoration and red paint, in places. Unfortunately this last vessel, which originally must have been very attractive in appearance, has lost a part of what

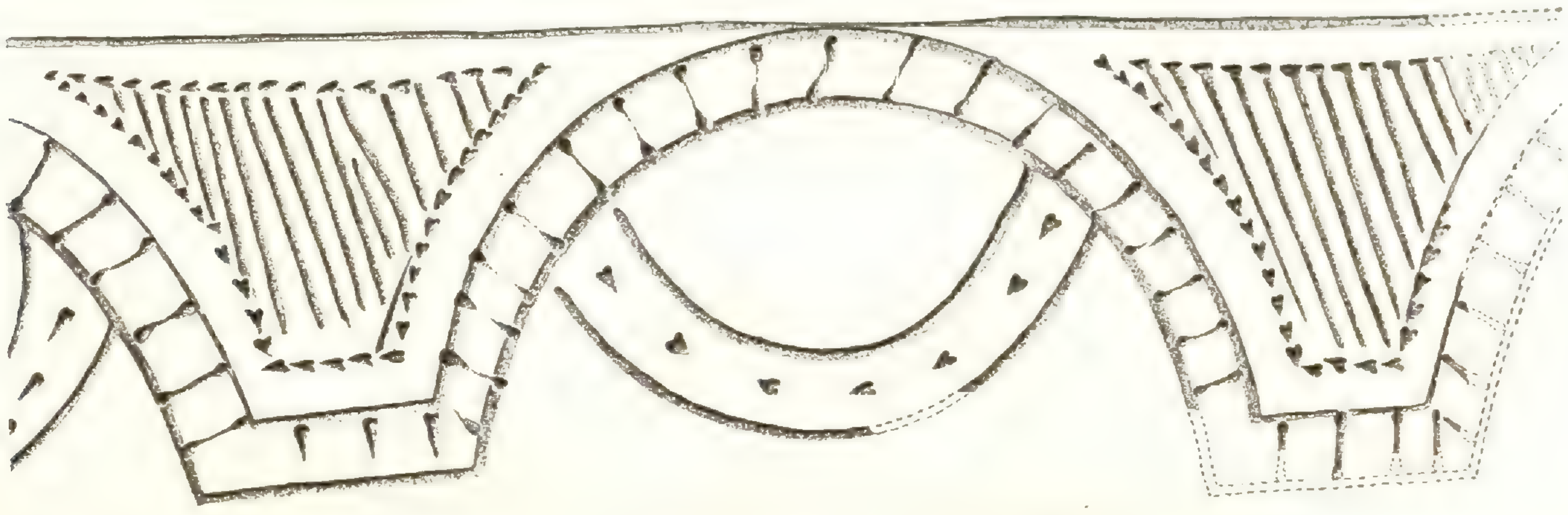


FIG. 10.—Decoration. (One-half size.)

represented the stem end of the gourd, and this part presumably was missing before the interment of the vessel; in fact its imperfect condition may have suggested its ceremonial use with the dead. The ware is excellent, the decoration carefully done. This vessel, whose imperfect condition was a great disappointment to us, is shown in Plate XIII, Fig. 1; its decoration, in diagram, Fig. 11, in which the red pigment (except on the stem portion, which is not shown) is indicated by diagonal lines.

A short distance farther into the mound fragments of other decorated vessels were found.

No bones lay with any of the earthenware. Apart from human remains was a mass of flint, rudely chipped into the form of an axe.

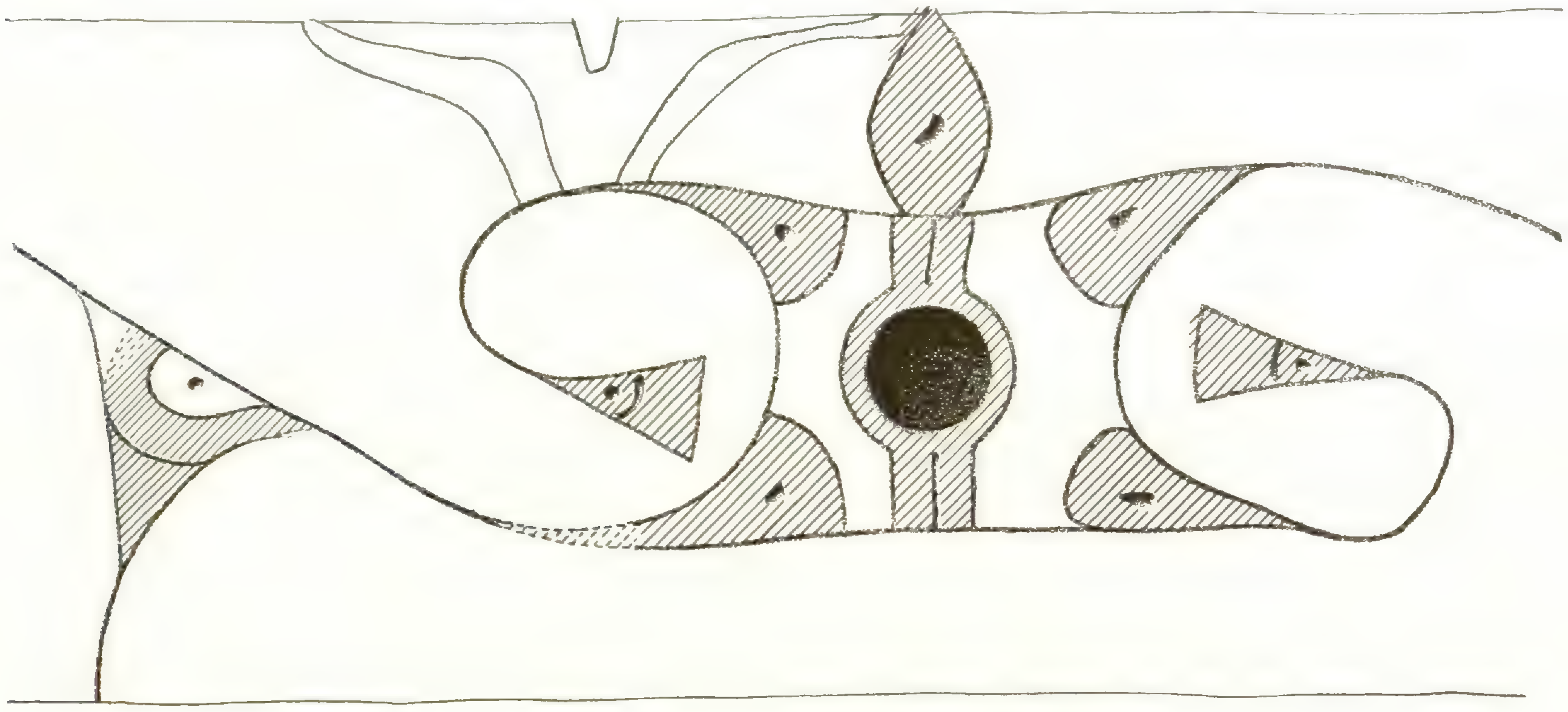


Fig. 11.—Decoration. (Two-thirds size.)

The burials, five in number, with one exception were near what seemed to be the base, which consisted of yellow, undisturbed sand differing from the gray of the mound.

Mounds on the Pate Place, Houston County, Alabama.

Pate Landing is slightly more than 123 miles up Choctawhatchee river. The mound, a short distance from Pate Landing, though not noteworthy as to size, is a veritable landmark on the Choctawhatchee. Persons more than fifty miles away told us of visits to it and described their digging.

The height of the mound is about 8 feet at present; it has been so dug into, having a great excavation centrally, and others all over it, including large trenches from the margin inward, that it no longer possesses any regularity of outline, so that it would be impossible to indicate its original diameter.

We learned that the mound had changed ownership since our permission to dig it had been obtained, and we made no effort to procure the consent of the present owner after having observed the condition of the mound.

Mounds and Sites Investigated on the Northwestern Florida Coast and Rivers.[1]

Mound near Pippen's Lake, Choctawhatchee Bay, Walton County.
Mounds in Big Hammock, Choctawhatchee Bay, Walton County.

[1] The Flint, a river of Georgia, is included in this list.

Mound near Basin Bayou, Choctawhatchee Bay, Walton County.

Aboriginal Cemetery on Hogtown Bayou, Choctawhatchee Bay, Walton County.

Mound near Mack Bayou, Choctawhatchee Bay, Walton County.

Mound near Philip's Inlet, Gulf Coast, Bay County.

Mound near West Bay Creek, St. Andrews Bay, Bay County.

Mounds in Brock Hammock (2), St. Andrews Bay, Bay County.

Mound west of Burnt Mill Creek, St. Andrews Bay, Bay County.

Site near Bear Point, St. Andrews Bay, Bay County.

Mound near Davis Point, St. Andrews Bay, Bay County.

Mound near Farmdale, St. Andrews Bay, Bay County.

Mounds near Crooked Island, St. Andrews Sound, Bay County.

Mound near Michaux Log Landing, Apalachicola River, Liberty County.

Mound near O. K. Landing, Apalachicola River, Calhoun County.

Mound near Rock Bluff Landing, Apalachicola River, Liberty County.

Mound near Hardnut Landing, Flint River, Decatur County, Georgia.

Aboriginal Cemetery near Carrabelle, Gulf Coast, Franklin County, Florida.

Mound near Old Creek, Gulf Coast, Wakulla County.

Mounds in Bird Hammock, Wakulla River, Wakulla County.

Site on the Lewis Place, Aucilla River, Taylor County.

Mound near the Warrior River, Taylor County.

Mounds on Hog Island, Gulf Coast, Levy County.

Mound in Cedar Keys, Gulf Coast, Levy County.

Aboriginal Cemetery in Cedar Keys, Gulf Coast, Levy County.

Aboriginal Site on Crystal River, Citrus County.

Mound on the Greenleaf Place, Crystal River, Citrus County.

Mound near Pippen's Lake, Walton County.

On open hammock land bordering a small sheet of water known as Pippen's Lake and between it and the beach of Choctawhatchee bay, about midway between White and Stake points on the bay, was the remainder of a mound said to be on land belonging to the state. Previous diggers had made a circular hole centrally in the mound, having a diameter at the top of 10.5 feet. The mound, 35 feet in diameter, was 2.5 feet in height as to the part remaining. This was completely dug down by us.

No bones were found, but beginning about 3 feet in from the margin in that part of the mound included between east and northeast, lying near together, was the regular ceremonial deposit of earthenware to be expected in mounds along the Florida coast in this region, and continuing a considerable distance to the southward.

So far as we could determine, there were fifteen vessels or considerable parts of vessels, some badly broken, and, in addition, a quantity of fragments of various vessels, including the neck of a wide-mouthed water-bottle. These vessels,

whole and fragmentary, lay in sand tinged slightly pink by admixture of iron ore and had with them two small sheets of mica. They are all of yellow ware, all small or of moderate size and each, so far as determinable, has the mortuary perforation of the base. A number of commonplace forms are undecorated or bear slight pinched, punctate, or line decoration.

Vessel No. 7 (Plate XIII, Fig. 2) has on two opposite sides birds' heads modeled without detail, and on the other two sides incised decoration representing tails and wings, the designs being practically the same.

Vessel No. 9, shown in Fig. 12.

Fig. 12.—Vessel No. 9. Mound near Pippen's Lake. (Height 6.25 inches.)

Vessel No. 13. This bowl, otherwise undecorated, has, around the opening, a novel and artistic arrangement in relief consisting of two fillets, the ends of each placed one above and one below that of the fillet opposed to it (Fig. 13).

Mounds in Big Hammock, Walton County.

In Big Hammock, which is about midway on the northern side of Choctawhatchee bay, all on property of Mr. Lee H. Jernigan, of Freeport, Florida, were three small rises in woods, some distance apart, most difficult to find without the services of a guide.

Mound A. Near the west side of Mullet creek, about 400 yards from the beach, was a rise about circular, 18 inches in height, having a diameter of 25 feet. It was dug completely away by us, nothing being met beyond a few sherds.

Fig. 13.—Vessel No. 13. Mound near Pippen's Lake. (Length 6.75 inches.)

Mound B. A rise about one foot in height, circular, having a diameter of about 36 feet. The rise was entirely dug away, yielding nothing except a few sherds, a very rude arrowhead or knife, and a small deposit of oyster shells, perhaps the debris of a meal eaten while the mound was building.

Mound C. About 18 inches in height, with diameters 22 feet and 35 feet. The mound was completely demolished. In several places were fragments of skulls and of long-bones badly decayed. About one foot below fragments belonging to a skull, was a celt probably of igneous rock, 7.8 inches in length.

In a pile near the center of the mound were parts of four vessels, but not nearly the complement of any one. Three had borne the small check stamp and one had been undecorated.

Mound D. This rise, on property belonging to Mr. D. S. Sellars, of Bolton, Fla., also in Big Hammock, was at the terminus of a low ridge, making the dimensions of the artificial part of the rise somewhat hard to determine. Probably a height of 2 feet and diameters of 42 feet and 60 feet would be approximately correct.

The eastern, and as it happened, the higher part of the mound, was entirely dug down by us, care being taken to keep the digging along undisturbed yellow sand where graves below the base could be detected, if present. A single, small sherd was the only object encountered.

Mound near Basin Bayou, Walton County.

The mound near this bayou described in a previous report[1] was on the western side of the bayou, while the one in question lay to the eastern side in pine woods, the property of the R. E. L. McCaskill Co. of DeFuniak Springs, Fla.

Fig. 14.—Vessel of earthenware. Mound near Basin Bayou. (Height 5.25 inches.)

This mound, 47 feet by 38 feet in diameter, had centrally an excavation 11 feet by 13 feet made previous to our visit. The height of the mound, 2 feet 10 inches, no doubt had been affected to some extent by the excavation.

On the surface was a fragment of bone, apparently human, and other fragments, seemingly thrown out from the central hole, were found in our digging, which practically included the entire mound. No undisturbed burials were encountered.

Fourteen feet in from the margin, on the base of the eastern part of the mound, were seven vessels, two in fragments, the others having portions missing. Two are undecorated, three bear a rude complicated-stamp decoration encircling the rim, while two have interesting incised designs. The decoration of one, a kind of jar (Fig. 14), is shown in diagram in Fig. 15. The other vessel, of yellow ware, approaches in shape an inverted, truncated pyramid with

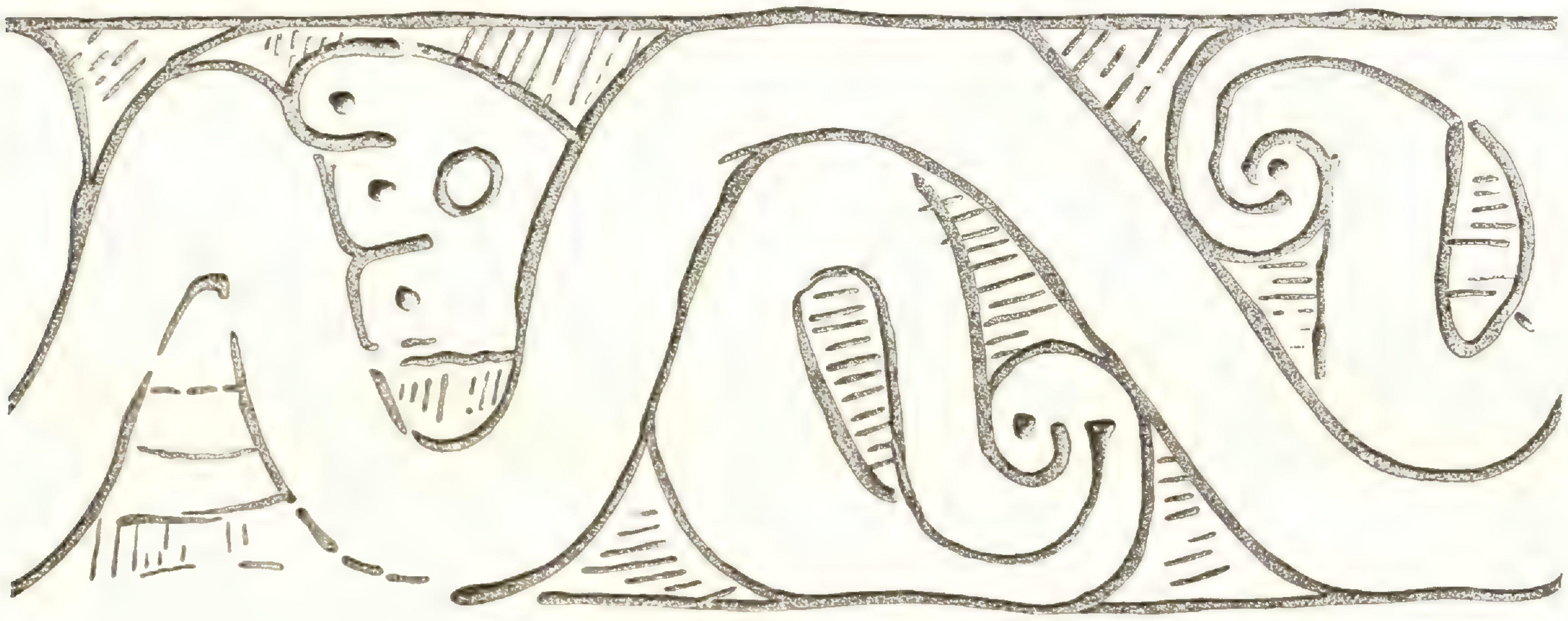


Fig. 15.—Decoration. (One-half size.)

[1] "Certain Aboriginal Remains of the Northwest Florida Coast, Part I." Journ. Acad. Nat. Sci. Phila., vol. XI.

rounded corners, though the opening of the vessel representing the base of the pyramid is somewhat constricted. There are four interesting designs, one on each side. In spite of considerable ceremonial breakage, in one instance from

FIG. 16.—Vessel of earthenware. Mound near Basin Bayou. (Height 5.9 inches.)

the inside out, and the absence of some of the fragments, the designs on each pair of opposite sides being the same save for minor details, we are able to form a clear idea of the ornamentation. One of the designs is shown on the vessel (Fig. 16), and the other in diagram (Fig. 17). The square, flat base of this vessel was intact when found, as was that of the vessel previously described.

Near this ceremonial deposit was a small bowl, and in the southern part of the mound, together, were a small undecorated bowl and a vessel in many fragments, bearing a complicated stamp.

Aboriginal Cemetery on Hogtown Bayou, Walton County.[1]

In 1901, as we have stated, we carefully investigated the region bordering Perdido bay (the coast-boundary between Alabama and Florida), Pensacola

[1] Since our first visit to Hogtown bayou, that part of Washington county which then included the bayou has been added to Walton county.

bay, Santa Rosa sound, Choctawhatchee bay, on the northwestern Florida[1] coast, publishing a report[2] of our work the same year, with full descriptions and numerous illustrations.

In our report (p. 496) we wrote as follows, describing certain shell deposits on Hogtown bayou,[3] Choctawhatchee bay:

"At Hogtown bayou are the principal shell deposits of Choctawhatchee bay, which are extensive, but in no wise comparable with those of the St. Johns river [Florida], or with many on the Florida east coast, or on parts of the west coast, farther south.

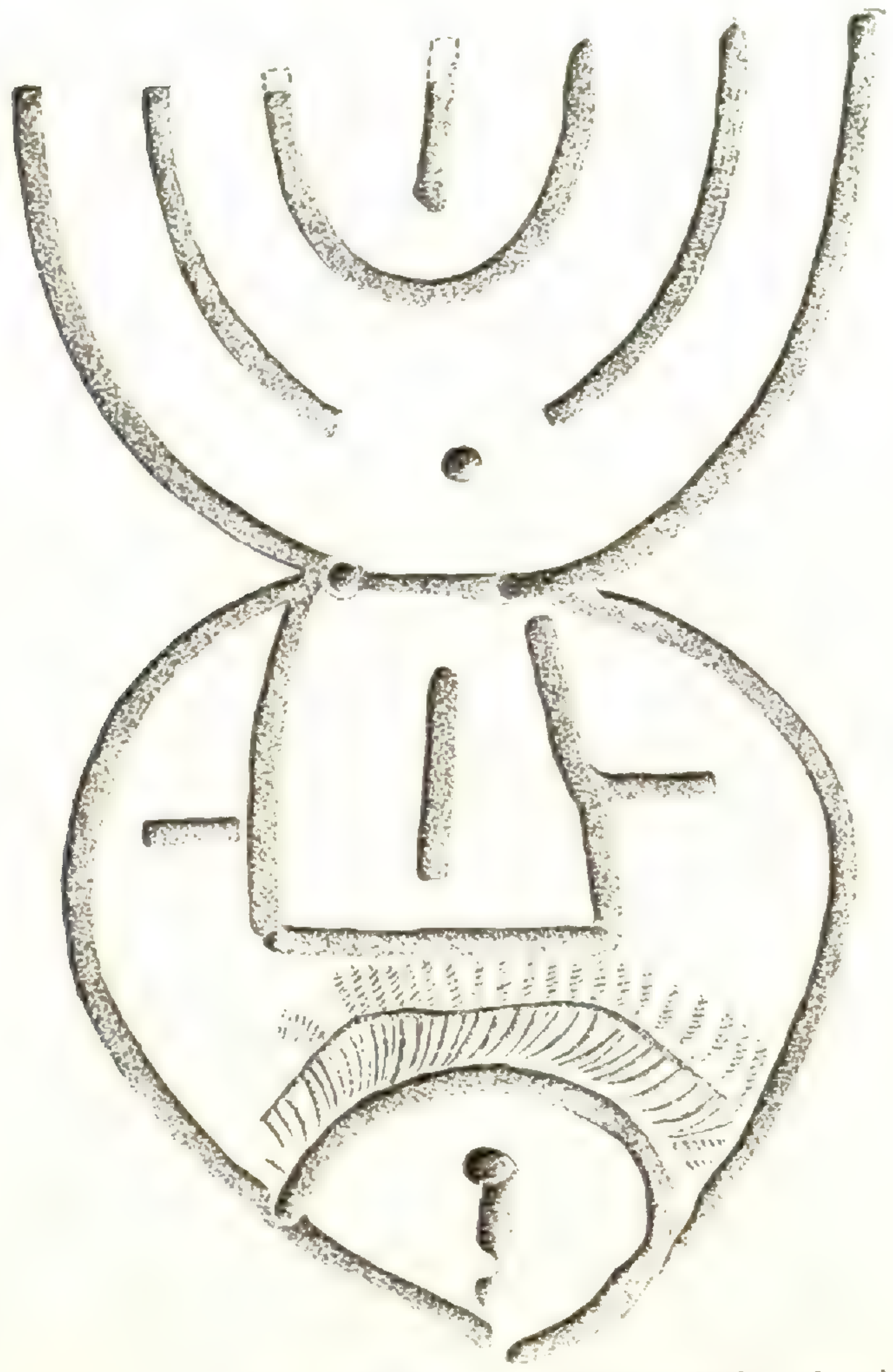


FIG. 17.—Decoration. (Two-thirds size.)

"It is our belief that a cemetery lies undiscovered at this place, as previous search by others has failed to locate a mound there, and careful investigation on our part availed only to find a small mound near the water's edge, about one mile up the bayou, on the south side."

At that time the region was comparatively wild, and information derived from inhabitants was difficult to obtain, while obviously an individual or members of an expedition could not spare unlimited time forcing a way through a wide extent of undergrowth in the hope of coming upon surface indications of an aboriginal cemetery.

Since our first visit, however, there has been a considerable influx of settlers around the bayou, and on thick hammock[4] land, near Mack Bayou, a part of Hogtown bayou, on property the ownership of which we did not exactly determine, near but not immediately with the shell deposits, an aboriginal cemetery has been discovered and considerably dug into in a desultory way by residents and others.

The cemetery, consisting of various low rises of sand, near together, was first noted, we were told, through the presence of aboriginal pottery projecting above the surface. The aboriginal cemetery near Point Washington, which we

[1] Except part of Perdido bay.

[2] "Certain Aboriginal Remains of the Northwest Florida Coast, Part I." JOURN. ACAD. NAT. SCI. PHILA., vol. XI.

[3] Some now call it Santa Rosa bayou.

[4] Hammock land on which grow palmetto, oak, and other non-resinous woods, the term being used in contradistinction to pine woods, the prairie, the swamp, or the marsh. The word is used by Captain Bernard Romans writing in the eighteenth century in his "A Concise Natural History of East and West Florida," New York, 1775.

dug out on our previous visit to this region, on Choctawhatchee bay, to the eastward of this cemetery, originally had been come upon in this way.[1] On our visit this season to the Hogtown bayou site we devoted seven working days, with six men to dig, to the investigation of the place. The rises, as a rule riddled with small excavations and covered with fragments of pottery, were surrounded by us and completely dug through where indications from trial-holes and the use of the sounding rod justified it, yielding excellent results, though in addition to the previous wreckage we had to contend with adverse natural conditions. The sand was very damp, water being reached at a depth of less than three feet during part of our visit, and at considerably less than that throughout the remaining part when high tides prevailed in the bay. Consequently the earthenware, saturated with moisture, presented but little resistance to the roots with which the whole area was replete, including the permeating ones of the scrub palmetto found filling many of the vessels in solid masses. These roots not only were direct agents in the wrecking[2] of much pottery, but were the cause of extensive breakage when our men were forced to cut through them with spades or with axes.

Although this site, as we shall see later, was post-Columbian all the pottery found by us in fragments on the surface or in the course of our investigation is purely aboriginal in every detail, and of the same class as is that found by us in our former investigation in the aboriginal cemeteries between Perdido and Choctawhatchee bays, inclusive. The abundant decoration consists largely of combinations of straight lines, of the scroll, and of animal elements (limbs, mouth, eyes, etc.), incised or trailed, and sometimes heads modeled in relief or in the round. Considerable of the incised decoration, mainly from one of the rises, at the Hogtown bayou site, contains kaolin in the lines, the white clay presenting a pleasing contrast to the dark background of the ware.

As this ware is so extensively shown in our earlier report, it has not seemed necessary to illustrate it here. Practically all of it has been presented by us to the Museum of the American Indian, Heye Foundation, New York City.

The ceremonial "killing" of the vessel, varying between a carefully drilled hole about the diameter of that of a lead pencil, and the knocking out of the entire base, was practised at this site, though some vessels, including several found over burials, had bases intact. The mortuary perforation made in the base of vessels previous to the firing of the clay was not found.

That form of urn-burial,[3] namely, a bowl turned over a skull alone, or a skull having a few bones or fragments of bones with it (sometimes mere traces at this place, where moisture speeded decay), first described by us as occurring in this region, was abundantly represented here. The proportion of such, however, among the unenclosed burials varied greatly in the different rises.

[1] "Certain Aboriginal Remains of the Northwest Florida Coast, Part I," page 472.

[2] A large bowl from this site, found by us in forty-nine fragments and subsequently put together, retains its pristine symmetry. It has been presented by us to the U. S. National Museum.

[3] See our "Urn Burial," Handbook of American Indians. Bul. 30, Part 2, Bur. Amer. Ethn.

The covering bowls ranged in diameter between 18 and 6.5 inches, the latter fitting the skull like a cap, though such small bowls were exceptional. However, a few even smaller were found inverted over traces of bones presumably of infants whose remains had almost decayed away. In fact no bones from this place were in a condition to permit their preservation entire.

The unenclosed burials at this site usually were only parts of the skeleton, decaying and broken, most often including what had been the skull. Some of these burials are described in detail in connection with the artifacts accompanying them.

The interments, at various depths, were surrounded by gray sand and sometimes extended into yellow sand which was the color of the undisturbed material of the site, except on the surface where the gray sand was found. Individual burials, however, were not distinctly marked, and it is likely the burials were made in groups, at times, at all events.

This cemetery distinctly had not been a dwelling-site in which interments had been made, as we sometimes see elsewhere, no midden debris being on the surface or in the sand, and the shells of the oyster denoting the use of this bivalve for food were, as we have said, at some distance from the burials.

With the unenclosed interments sometimes were artifacts, and also, occasionally with the urn-burials, in some cases under the bowls, and in other instances just outside the vessels. These accompanying artifacts included: glass beads with a number of burials; objects of iron or of steel, among which, in one instance, was a pair of scissors; shell beads; columellæ of marine univalves; rude shell implements; one shell ear ornament of the pin variety; thirteen celts, all wrought from imported rocks, between 2 inches and 8.5 inches in length; a graceful discoidal also of material foreign to Florida, 2.7 inches in diameter, slightly convex on each side, and having an even circumference permitting the object to roll in a direct course—doubtless a chungkee stone; four wrought stones in diameter from 1.6 inch to 2.6 inches, shaped like much truncated cones (save in three instances the upper side was somewhat convex), presenting, owing to the slanting surface of the periphery, a difficulty in keeping a straight line in rolling. Henry Timberlake in his "Memoirs" (p. 77) speaks of a game played with stones having beveled sides. One of these stones had on the upper side a pit in which perhaps nuts had been placed for cracking.

There was also a rude disc made from silicious material, most likely a pebble pecked into shape.

With the burials as a rule, were twenty-four lancepoints and arrowheads or knives, nearly all very rudely made, owing perhaps to the inferiority of the flint. In only one instance among them, we believe, can a projectile point be differentiated from an implement for incision.

With a burial lay a disc about 2.25 inches in diameter and 4 inches in thickness, approximately, which Doctor Keller has determined to be almost pure tin interiorly, having a sharply defined brownish-gray crust on the outside.[1] Also

[1] Curiously enough, this object has led to the discovery of a new salt of tin. Consult "A new

with bones was the object of earthenware shown in Fig. 18. This object cannot be a trowel used in the smoothing of earthenware, the presence of the knob precluding the idea. It most resembles a stopper for a bottle, but bottles in this region, when occasionally found, have wide mouths, so the question of identity remains an open one.

Fig. 18.—Object of earthenware. Cemetery on Hogtown Bayou. (Full size.)

The following burials are worthy of description in detail, giving as they do a fair conception of the interments in general and showing how accompanying artifacts lay in relation to them.

Burial No. 2, fragments of bone, crowns of teeth of an adult. With these were two spearheads of flint, a celt, and the stopper-shaped object of earthen-ware already described.

Burial No. 3, a few fragments of long-bone and crowns of teeth, having a large bowl inverted over them. Also inverted, on the base of the larger vessel and covering the ceremonial hole in it, was a small bowl, crushed when found.

Burial No. 5, under water. The digger stated he had observed traces of bones at first. All, however, had disappeared in the mingling of water and sand. With this presumable burial was a deposit of eight spearheads or arrowheads and knives, some broken; a small, quartz discoidal; nodules and chips of flint; bits of sandstone for hones.

Burial No. 10, fragments of a skull covered by an inverted bowl on which was another bowl inverted. An ear-plug of shell was with the fragments of bone.

Burial No. 17, part of a large, inverted bowl, under which no bones were found, though doubtless, as no sign of disturbance was present, some had been there. This substitution of a part for the whole, in this connection, was repeatedly noted by us here under conditions precluding any idea of previous disturbance, which might account for the fragmentary condition of the bowl.

On and over the basal perforation of the large fragment was a small, undecorated pot, erect. Beneath the fragment were two inverted vessels of medium size in which no trace of bones remained. Outside the large fragment, together, were an inverted vessel containing only clear sand, and a six-pointed platter, a form, we believe, not found outside this Florida coast region.

Burial No. 19, small fragments of bone from a femur, pelvis, etc., not covered by a bowl but accompanied by a small, undecorated pot containing two large shell beads. Near this pot were a small bowl and another small pot.

Burial No. 33, fragments of bone, some having belonged to a skull, covered by a large part of a vessel inverted and by a number of other fragments not belonging to the vessel of which the principal fragment was a part. Surmounting this deposit of broken pottery was an entire bowl inverted.

Oxychloride of Tin," by Harry F. Keller. *Journal of the American Chemical Society*, vol. XXXIX, No. 11, November, 1917, p. 2354 *et seq.*

Burial No. 36, an inverted bowl only 5.5 inches in diameter, covering a single remaining fragment of bone.

Burial No. 39, immediately below another urn-burial and probably interred at the same time with it, was a large, inverted fragment of a bowl covering parts of a skull and of a clavicle. Partly under the large fragment and extending beyond it were a number of parts of other vessels, together.

Burial No. 45, remains of a bunched burial, having fragments of three skulls and other bones. Associated with these were a quantity of discoidal shell beads, a pair of shears greatly rusted, and a bell of brass, resembling our sleigh-bells, possibly a hawk-bell, though seemingly large for such a purpose.

Burial No. 47, a bowl inverted over a skull. In contact with this bowl on one side, also inverted and apparently an additional contribution, was a six-pointed platter.

Burial No. 63, fragments of a vessel over a skull with which were two lance-points of sheet-copper, each 4.5 inches in length, lying evenly one upon the other. The points of these objects are so rounded that they hardly can have served for use in war, and may have been ceremonial. Moreover, the length of one side of each has, near the margin, a row of small indentations, and the stems, one of which is rounded, the other rectangular, have, respectively, one and two perforations, indicating that the objects may have served as pendants. With them was a tubular bead of glass. Near, and probably with, this burial were a small celt, and three arrowheads or knives, of flint.

Burial No. 67, traces of bone having near them a vessel only 2 inches in diameter, and in a little pile: a tubular bead of silicious material, 1.7 inch in length; a similarly shaped one of red claystone, 1.4 inch in length; and two shell beads.

Burial No. 69, indications of a skull and long-bones, having with them two bottles, two small bowls, and another vessel, the bowls inverted, the others upright.

Burial No. 91, a bowl inverted and having leaning against it two vessels, each on edge. Beneath the bowl was a jar also inverted, covering traces of bones and three shell beads.

Burial No. 97, a large bowl inverted over another, along side which was part of a bowl. These deposits below rested on a skull and fragments of other bones.

Burial No. 99 was about 3 feet from Burial No. 97. It consisted of a bowl inverted over fragments of bone not including a skull, and the remainder of the bowl of which part was found with Burial No. 97. This half with Burial No. 99, however, covered no human remains, so far as we could determine. We consider this discovery of two parts of the bowl, each placed with a different burial, to be a very interesting feature.

Burial No. 111, an inverted bowl, imperforate, covering a skull.

Burial No. 112, a bowl, imperforate and inverted immediately below Burial No. 111. Resting on its upturned base was the skull belonging to that burial. Beneath this bowl (Burial No. 112) were traces of a skull. These two burials presumably had been made at the same time.

Below Burial No. 112 was still another bowl, crushed (as were so many at this cemetery, though we have not felt it necessary to specify each case), probably covering a third burial, but this bowl being under water, the question could not be determined where bones were so decayed.

Mound near Mack Bayou, Walton County.

About one-eighth mile east of Mack bayou, on the shore of Hogtown bayou, was a mound of yellow sand, on property belonging to Dr. Charles E. Cessna, of Oak Park, Ill.

This mound, about 2.5 feet in height and 28 feet in diameter, in which a hole about 3 feet square had been dug centrally previous to our coming, was practically demolished by us.

Thirty-two inches down, somewhat in from the margin, in sand considerably darker than that of the mound, forming a kind of deposit 18 inches by 3 feet and from 2 to 3 inches in thickness, was a pendant of ferruginous claystone, about 3.5 inches in length, flat on three sides, convex on one of the major sides. The hole for suspension shows signs of wear on one side, as by a cord. No bones were with this object, though presumably a burial had caused the discoloration of the sand.

On the center of the base of the mound (not reached by the previous digging) was a bar-amulet of chloritic schist, also in dark sand in which no bones remained.

An imperfect arrowhead or knife, of flint, and a hone of sandstone, apart, lay in the yellow sand of the mound.

Mound near Philip's Inlet, Bay County.

On hammock land, the property of Judge Ira A. Hutchinson, of Chipley, Fla., was a mound about 300 yards in from the Gulf beach and about one-half mile northwest from Philip's Inlet. This mound, circular as to base, had a diameter of 45 feet. The height was difficult to determine, as the mound had been dug into centrally to a considerable extent, and the sand thrown out, covered with growth, resembled a part of the mound. Probably originally the altitude was between 4 and 4.5 feet. While several small trenches had been dug into the mound prior to our coming, the eastern part of it was intact. All this eastern part, all the central part including much surrounding the previous excavation, and most of the rest of the mound were dug down by us.

Two burials only were encountered, 8 feet and 7 feet in from the margin, respectively, both near the pottery deposit to be described later. One burial consisted of a few decaying fragments of bones; the other was a small bunched burial badly decayed, having with it two celts which, like two other hatchets found apart from burials in this mound, are seemingly of eruptive rock. These varied between 5.5 and 8 inches in length.

Also two arrowheads of flint and some bits of mica were found separately.

On the base, near together, in the central part of the mound, were two deposits of clamshells (*Rangia cuneata nasuta*), each consisting of about a quart.

The pottery deposit commenced at the margin of the east northeastern to the east southeastern part of the mound, and continued in about to its center, though in greatly diminishing quantity. A few whole vessels had been put in (all having the mutilation of the base), but parts of vessels and deposits of fragments of various vessels mixed together predominated. In decoration the small check stamp and the complicated stamp are represented, while one small vessel has a rather faint, incised design. Two sherds of the same vessel, which had borne an interesting incised decoration, were found a considerable distance apart. A small bowl has a kind of meander design incised and punctate.

FIG. 19.—Vessel of earthenware. Mound near West Bay Creek. (Height 5.25 inches.)

MOUND NEAR WEST BAY CREEK, BAY COUNTY.

On hammock land belonging to Mr. Linzey Buchanan, living on the place, was a mound about one-half mile east northeast from the union of West Bay

creek with the extremity of West bay, a part of St. Andrews bay, and about one hundred yards in from the shore of the bay.

The mound, about 2 feet high and 25 feet in diameter, was dug out by us except some marginal parts, no burials being found, though doubtless some formerly there had decayed away.

Beginning near the margin of the eastern part of the mound and extending about 8 feet in, near the surface, was a deposit of pottery consisting of two whole vessels, small and undecorated, one being without the basal perforation, and fragments belonging to various other vessels, a mixture in which, in no instance, were found materials for a complete reconstruction.

Among the fragments were represented the small check stamp and the complicated stamp.

A number of parts of a vessel, found considerably separated, when put together proved to have belonged to a most interesting vessel on which, in relief, had been representations of four duck heads (Fig. 19). Unfortunately not sufficient of this vessel was found to furnish a basis for a complete restoration of the extreme upper part. The base is intact, the breaking and scattering presumably fulfilling the ceremony.

Several low mounds in pine woods in this region were explored without discovery of bones or of artifacts.

Mounds in Brock Hammock, Bay[1] County.

A small mound in Brock Hammock, about 3 miles southerly from West Bay P. O., is described by us in a former report.[2] Near this mound, on hammock land belonging to the West Bay Naval Stores and Lumber Co., St. Andrews, Fla., were two low rises, a short distance apart.

Careful search with trial-holes unearthed dwelling-site debris, shells, fishbones, sherds, etc. In one was a skeleton partly flexed to the right.

Mound west of Burnt Mill Creek,[3] Bay County.

In pine woods belonging to the Sale-Davis Co., Southport, Fla., was a mound about one-quarter mile west of Burnt Mill creek and one mile from its mouth, approximately. This mound, about 2.5 feet in height from the outside and 3 feet from base to summit, had a basal diameter of 45 feet.

All the eastern part of the mound and also considerable on each side of it (in which latter digging nothing was found), as well as all the central portion, were dug out.

On the base near the center was an inconsiderable deposit of human bones

[1] That part of St. Andrews bay in which these mounds are was included in Washington county at the time of our visit in 1902.

[2] *Op. cit.*, p. 140.

[3] In our 1902 report two mounds on the opposite side of this creek are described, *op. cit.*, p. 140, *et seq.*

cremated into small fragments. Centrally were two bunched burials of limited size, and part of a skull alone.

Also near the center of the mound were bits of an ornament of sheet-copper and a fragment of human skull which the copper salt had preserved. No other bones were near. This affords an example of how skeletal remains may disappear, since but for the presence of the copper salt no trace of this burial would have remained.

Apart from burials were: a small celt of sedimentary rock; a thick sheet of mica; a mass of graphite, dark and soft, somewhat worked out, perhaps for paint.

Beginning at the eastern part of the mound, at the very margin, and continuing in about 8 feet was the ceremonial deposit of pottery, made up almost entirely of vessels that had been put in whole (though some were crushed when found) or having only minor parts missing through former breakage. All these had the usual perforation knocked through the base.

Comparatively few fragments were with this deposit, which consisted of twenty-one vessels, without any deposits made up of miscellaneous bits of earthenware from various vessels, such as one often finds in this region.

A few thin sheets of mica, and at one place a deposit of charcoal about 1.5 foot by 2 feet, lay with the earthenware.

The following vessels from this mound merit special description:

Vessel No. 1. A vessel of excellent ware bearing in relief an effigy of the head of a horned owl from which a small part of the beak is missing (Plate XIV). Deeply incised decoration is about the head; the wings, in relief, also have an incised design, while another, shown in diagram in Fig. 20, represents the tail.

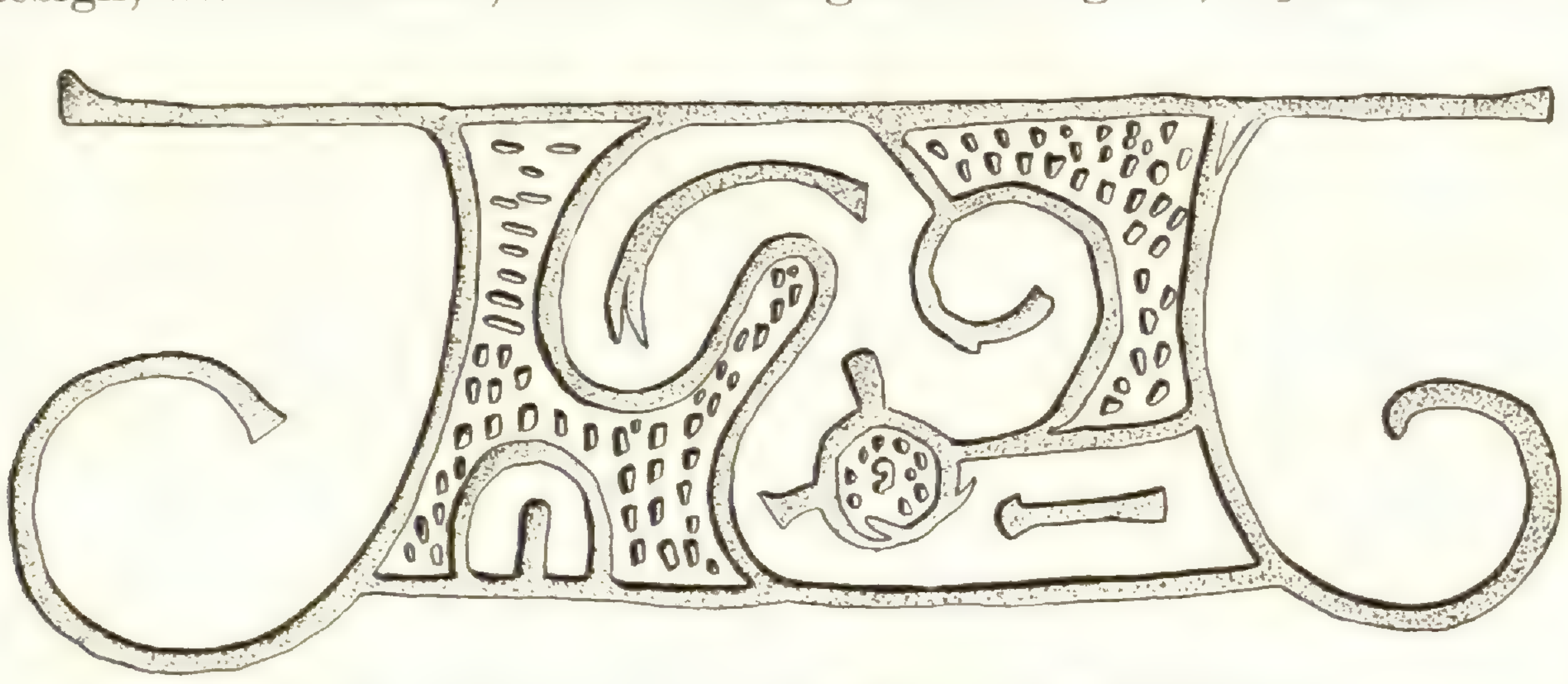


Fig. 20.—Vessel No. 1. Decoration. (Two-thirds size.)

Vessel No. 2, in fragments, of which a number are missing, has been of the open-work variety, small portions having been excised in places around the upper part of its body. In addition it has had an incised conventionalized representation of a rattlesnake, a most interesting design, from which, however, so much is missing that restoration is impossible.

Vessel No. 3, found broken but with all parts present, bears five deeply incised

MOUND WEST OF BURNT MILL CREEK, VESSEL NO. 1. (FULL SIZE.)

designs, three apparently representing the wings, and two the tails, of birds (Fig. 21).

Fig. 21.—Vessel No. 3. Mound west of Burnt Mill Creek. (Height 8 inches.)

Site near Bear Point, Bay County.

In our former report on this region[1] we describe a mound near Bear Point (then included in Washington county) which was dug by us, and speak, in addition, of a neighboring circular enclosure of shell.

Later, in the town of St. Andrew, not far from Bear Point, we found an aboriginal cemetery which was enclosed by a similar wall.[2]

In the hope that the Bear Point enclosure might also contain a cemetery, we visited the place again and carefully prodded all the area within the circular wall, but without success. In addition, the three flat mounds at Bear Point,[3] pronounced domiciliary by us, were prodded over with the utmost care, without any tangible result, however.

[1] *Op. cit.*, p. 174, *et seq.*
[2] *Op. cit.*, p. 175.
[3] *Op. cit.*, p. 175.

Mound near Davis Point, Bay County.

About one mile northerly from Davis Point, on East bay, a part of St. Andrews bay, on property of Mrs. A. W. Kirven living nearby, was a mound on the verge of hammock[1] land, about 3 feet in height and 45 feet in diameter of its circular base. Evidence of but little previous digging was apparent.

Fig. 22.—Vessel No. 1. Mound near Davis Point. (Height 6.25 inches.)

Having found with the aid of steel rods the pottery deposit where we expected it would be, we dug a trench at the eastern margin of the mound, carrying it some distance beyond the center. This trench, 28 feet wide at the beginning, narrowed to a width of 12 feet at the end, its length being 30 feet.

The pottery deposit commenced almost due east in the margin of the mound, and continued in about 13 feet. It was not a layer, being somewhat scattered, and, beginning with a number of miscellaneous sherds, continued composed of vessels sometimes in groups, sometimes separately, with numerous fragments associated Seven feet from the margin of the mound the deposit was an equal

[1] It may be well to repeat that the hammock in southern United States bears the palmetto, the oak, and other woods, and the term is used in contradistinction to pine woods, the prairie, the marsh, and the swamp.

number of feet in width, at which it continued to the end, where it broadened about 2.5 feet additionally, apparently to join Burial No. 1, the first to be encountered in the digging.

The vessels, complete or nearly so as a rule, though some lay crushed to fragments, all, where it was determined, had the mortuary mutilation of the base.

About thirty-two nearly complete vessels were represented. On these but little decoration is apparent. With one exception, that on a large fragment, practically no incised design was encountered in the pottery of the mound. Two vessels have lines of punctate markings near the openings, and the small check-stamp, poorly done, is on several sherds.

Some vessels bear in places a complicated stamp decoration, faintly impressed, and, as a rule, not covering the entire body. Some clearer designs, however, appear on a few of the pottery fragments.

In form the vessels are generally commonplace and the workmanship displayed in their making leaves much to be desired.

In this eastern arm of St. Andrews bay, however, some fine examples of aboriginal earthenware were found at the time of our previous visit.

The following vessels from this place are worthy of special note:

Vessel No. 1, an effigy vessel of a rude description, having a human head in relief (Fig. 22).

Fig. 23.—Vessel No. 3. Mound near Davis Point. (Height 5.1 inches.)

Vessel No. 3 has a body composed of four lobes, above which is an upright neck about one inch in height (Fig. 23). Traces of red pigment are apparent on two of the lobes and around the neck.

Vessel No. 4 has a body composed of two lobes. Above the low neck appears a rude head of a bird, with prominent eyes. Height 5.5 inches.

Vessel No. 5 has been a compartment vessel having three divisions in line, one of which unfortunately is absent. Throughout our first visit to the northwest Florida coast numerous compartment vessels of various forms were found.

Seven burials, all badly decayed, were encountered in the digging, only one having an artifact in association. Five were small bunched burials; each having a single skull; one consisted of a skull alone, and Burial No. 1, found 30 inches from the surface, at the northern limit of the pottery deposit, was a small, bunched burial having two skulls. With it were a few oyster shells and a celt of volcanic rock, 8 inches in length.

Burial No. 2, the isolated skull, was at the end of the pottery deposit, nearer the center of the mound. The remaining five burials lay apart from the deposit at some distance from it laterally, or beyond it in the mound.

About on the base of the mound was a small deposit of charcoal. Two flat pebbles, one of which had been used as a hammer, and several fragments of marine shells, were included in the pottery deposit.

Mound near Farmdale, Bay County.

About 2 miles due east from Farmdale, in pine woods bordering a small hammock just back of the bay shore, on property of Mr. S. M. Smith, of Auburn, Fla., was a mound about 2 feet high and 35 feet across the base. A small excavation had been made in it prior to our coming.

A trench along the base, 35 feet wide at its beginning in the eastern margin of the mound, was carried by us 31 feet, passing through its center, gradually diminishing in width until at the end it was but 10 feet across.

About 6.5 feet east from the center commenced a deposit of charcoal of considerable size, the original limits of which, unfortunately, we could not determine, as the central digging, before referred to, had disturbed it. Though the sand below the charcoal showed evidence of heat, there was not sufficient to induce us to believe that a fire had been maintained there, but rather to suppose that burning wood had been placed on the sand and covered. Moreover, the charcoal was in large masses and no ashes accompanied it.

With the charcoal were a few fragments of calcined human bones. Probably the greater part of the deposit had been removed by the early digging.

Near the charcoal and cremated remains were two lanceheads of flint, near together, one 3.9 inches in length, having lost a barb; the other a handsome piece 6.2 inches long.

About 18 inches down, 8 feet northwest from the center of the mound, were traces of bones, probably human. No other burials were met by us in the mound, though fragments of bones thrown out by the previous digging were encountered.

At the margin of the mound was a small pot. The deposit of earthenware scattered here and there, including eleven vessels, many whole or nearly so, and a

number of unrelated sherds, continued to about the beginning of the charcoal deposit.

With the vessels were three shell drinking-cups, one in fragments, two sufficiently preserved, though much decayed, to show the basal perforation which also is present in all the vessels, one having even two holes knocked from the inside outward.

Six of the vessels are plain, while five have line or punctate decoration in simple designs. One, a rather striking piece, bears a modified scroll of parallel lines, carefully executed. The rim, rising obliquely, presents four equidistant corners (Fig. 24).

FIG. 24.—Vessel No. 1. Mound near Farmdale. (Height 5.25 inches.)

One sherd, part of a broken bowl, bears a decoration which, while not artistic, undoubtedly would be striking if entire. A kneeling male figure, 1.5 inch in height as it appears at present, has been modeled in high relief, the part including the belly standing out about 1.2 inch from the bowl. Unfortunately the head of the figure is missing.

A hone of fine-grained sandstone was found apart from burials.

MOUNDS NEAR CROOKED ISLAND, BAY COUNTY.

A mound included in Calhoun county at that time was dug into to a small extent by us in 1902, and is described in our report as the "Smaller Mound in

Hare Hammock."[1] This mound, 3 feet in height and about 45 feet in diameter, was in an abandoned field, the property of Mr. E. E. Harrison, of Farmdale, Fla., and had been under cultivation. It was about 400 yards north from the head of St. Andrews sound. On one side of the mound was a depression caused by the removal of material for its making. Numerous low shell deposits were nearby in the hammock. It was completely dug down by us.

Thirteen burials, one a disturbance by recent digging, were encountered throughout the mound, the deepest 3 feet down, all very badly decayed. Of the twelve burials found in place, two were of the flexed variety, the rest being small bunches of bones, parts of skeletons, or mere fragments of them.

Four burials, including one of the flexed kind, had no shells in association. Of the remaining eight, six lay with deposits of shells (*Busycon perversum* and *Fasciolaria*, mostly the former), not numerous enough to be called in layers, above and beside them.

Two having regular shell deposits in connection with them will be described in detail.

Burial No. 5, partly flexed on the left, lay beneath a shell deposit of irregular outline, 5 feet 8 inches long by 3 feet 6 inches in width, and about 20 inches in thickness, approximately. In line and in contact with the foregoing, extending in toward the center of the mound, was another deposit of shells, 4 feet 8 inches by 2 feet 7 inches, and of the same thickness as the other. From it, extending farther in, was a kind of arm, 2 feet 5 inches in length by 10 inches wide. Beneath this deposit and the extension only a single fragment of a femur (Burial No. 6) was found, the rest of the skeleton probably having decayed away.

With a few of the burials were fragments of earthenware, some undecorated, some bearing a complicated stamp faintly impressed.

Apart from the burials were an undecorated pot and numerous sherds, mostly undecorated, some in little piles, also a very rude celt of sedimentary rock.

In level ground adjoining the eas-

FIG. 25.—Vessel of earthenware. Mound near Crooked Island. (Height 6 inches.)

[1] *Op. cit.*, p. 207, *et seq.*

tern side of the mound, extending out a few feet from it were ten vessels, some having parts missing in addition to the ceremonial hole broken in the base. Three of these merit particular description:

A vessel of yellow ware having a globular body and an upright neck, around which is a decoration made by imprints of some implement (Fig. 25).

A bowl (Fig. 26), some parts of which were not recovered, bears an interesting

FIG. 26.—Vessel of earthenware. Mound near Crooked Island. (Diameter 9.1 inches.)

incised decoration including portrayal of a bird's head, inverted, on two opposite sides. The designs between these heads vary somewhat and are represented in diagram, Fig. 27.

In Fig. 28 is shown a beautiful representation of a gourd in hard, smooth ware, bearing an incised decoration conferred with considerable care. Unfortunately a small part of the stem end of the gourd is missing through an early fracture.

About 400 yards northwest by west from the mound just referred to was the fine mound in which such interesting earthenware vessels were found by us, described in our 1902 report[1] as the "Larger Mound in Hare Hammock."[2]

A small remainder of the western part of this mound, left by us at the time of our first visit owing to the presence of recent burials, was dug down by us, this season, the burials having been removed.

[1] *Op. cit.*, p. 197, *et seq.*

[2] It seems to be doubtful if the hammock in which this mound was situated ever bore this name, generally at all events.

Six burials, badly decayed, some mere fragments, representing the bunched and the individual burial, were encountered on the base of the mound, all without artifacts and having above them no deposits of the *Busycon*[1] *pugilis*, such as

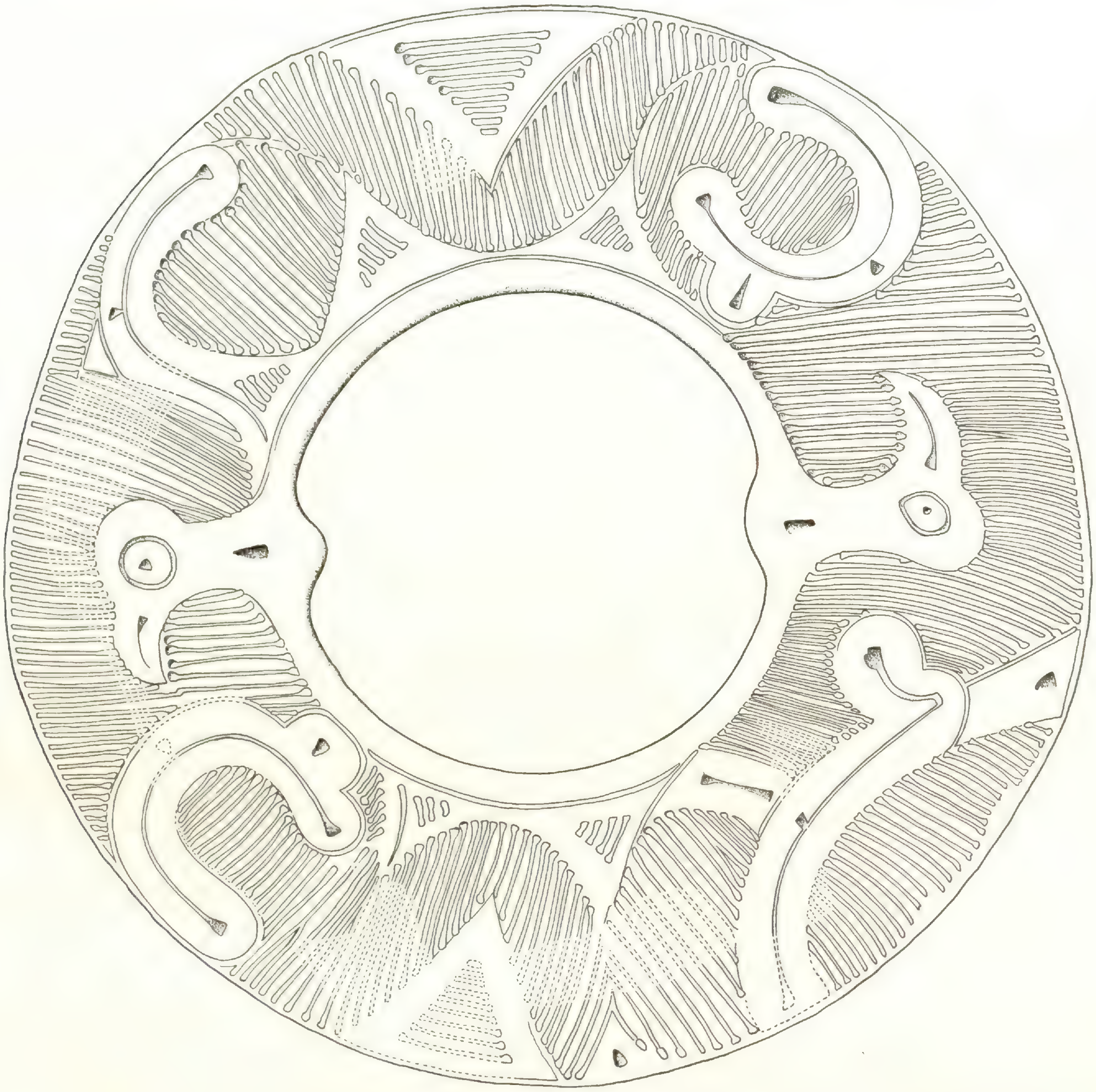


Fig. 27.—Decoration. (One-half size.)

were found with the burials in the other part of the mound at the time of our first visit.

A single undecorated bowl, somewhat broken in addition to the usual basal perforation, lay alone in the sand.

[1] At one time called *Fulgur*.

About 200 yards north by east from the mound is a dwelling-site about 2.5 feet in maximum height and 87 feet by 80 feet in diameter. This site, largely sand, contained considerable shell deposits here and there and numerous fragments of earthenware, mostly of excellent quality, with other general dwelling-site refuse. Trial-holes failed to come upon burials.

Fig. 28.—Vessel of earthenware. Mound near Crooked Island. (Height 4.1 inches.)

Mound near Michaux Log Landing, Liberty County.

This mound, on Apalachicola river, which could not be reached from the stream at the time of our former visit, owing to high water, is in woods on property of Messrs. L. E. and S. W. Michaux, living in the neighborhood, the mound being about a mile in a straight line in an easterly direction from Michaux Log Landing, which is about 8 miles by water and somewhat more than 4 miles by land, above Estiffanulga.

The mound, but little dug into before our coming, was about 3.5 feet in height, with diameters of 37 and 40 feet. A converging trench 37 feet in width on the chord of the margin was carried through the center of the mound.

Fragments of pottery were found a little north of east, about 2 feet in from the margin, the deposit continuing in about 11 feet and consisting in the main of fifteen vessels having but few intervening sherds. These vessels, whole or nearly entire as a rule, or if broken, having full or almost complete complement of fragments lying together, and probably accidentally crushed after interment and not broken and the parts ceremonially scattered, are commonplace in form. Some are without decoration; one bears the small check stamp; a number have

the complicated stamp faintly impressed in various designs. Incised decoration of poor quality is on one vessel and also on a single sherd. All have the basal mortuary mutilation.

One vessel, almost cylindrical, bearing a complicated stamp, lacks the entire rim. The part remaining has a diameter of 3.5 inches and is 8.5 inches in length.

Part of a quartz pebble, and a large barbed arrowhead of flint, were found apart from burials.

When our trench, which followed the base of the mound, was 18 inches deep, it came upon gray sand along the lower part, very compact and hard to dig, seemingly showing the effect of heat and having throughout particles of charcoal intermingled. This hard material, throughout covered by about 1.5 foot of ordinary sand, was still present when our digging was discontinued beyond the center of the mound, and was then about 2 feet in thickness. Presumably the entire nucleus of the mound consisted of this burnt sand.

The pottery latest found lay in this material, as did all the five burials encountered but one, none of these, however, being with the pottery.

Seven feet northeast from the center of the mound was a small deposit of calcined human bones. The other bones, single skulls in three instances, and once a skull having remnants of long-bones near it, were badly decayed.

Mound near O. K. Landing, Calhoun County.

About one mile in from Apalachicola river, following the road from O. K. Landing, in woods, is a mound about 3.5 feet in height and 35 feet across the circular base. Its ownership was not ascertained. Evidence of previous digging in it to a limited extent was apparent.

The eastern part of this mound, dug out by us, yielded two burials represented by fragments of bone. With one burial was a mass of galena, about the size of a fist of a child, pitted in several places as by use.

The pottery deposit consisted of various fragments showing, when decorated at all, the small check stamp, the complicated stamp, or incised designs of rudimentary character, with one exception, where somewhat better work is apparent.

There are also several undecorated bowls and another with encircling area about 2 inches in width beginning just below the rim, adorned with parallel ridges thrown into relief by trailing a tool with remittent pressure. The usual mortuary hole knocked through the base has been duplicated through one side in this vessel.

A small lump of galena was found apart from any burial.

Mound near Rock Bluff Landing, Liberty County.

We found at this place but a remnant, a large trench having been put through the mound from east to west by others before our coming, who, in addition, had extended the trench to include all the central part of the mound.

The mound, on the slope of a hill, originally may have been about 4 feet in

MOUND NEAR ROCK BLUFF LANDING, VESSEL OF EARTHENWARE. (FULL SIZE.)

height and 45 feet in diameter. It was on property of Mr. Richard Lester, living nearby, and was about one mile east northeast in a straight line from Rock Bluff Landing on Apalachicola river.

Considerable of the eastern part of the mound remained beyond the trench, which also was shallow in the outer portions, passing over considerable of the pottery deposit.

Thirteen burials were found by us, all too decayed to give any idea as to form. These burials were exceptional for this region in that a number of them lay in the area of the pottery deposit and with one individually had been placed a pot, while with another was a quantity of shell beads. Evidence of the use of fire was present with several of the burials.

In sand thrown back by the former diggers was a delicately wrought arrowhead of flint, and a beautiful celt seemingly of eruptive rock, 7 inches long, tapering at one end almost to a point.

In the eastern part of the mound such pottery deposit as was found included vessels and parts of vessels bearing the check stamp, the complicated stamp, several with interesting incised designs, and one in fragments with some parts missing, since restored, having two parts roughly globular joined by a cylindrical portion in which are four excisions. Below the rim is a kind of collar, the upper surface of which shows trailed decoration, while beneath it is a series of vertical imprints made with a tool. A mortuary perforation has been knocked through the base (Plate XV).

One bowl from this mound has, instead of the basal perforation knocked out after the baking of the vessel, a hole carefully fashioned previous to the firing of the clay.

Mound near Hardnut Landing, Decatur County, Georgia.

About one-half mile southwest from Hardnut Landing, on the right-hand side of Flint river, going up, now in woods but said to have been in a cultivated field in former times, at present the property of Mr. Samuel White, of Mt. Pleasant, Fla., was a mound 65 feet in diameter and 2 feet 4 inches in height. The diameter no doubt had been increased by the plow at the expense of the height.

The mound was dug throughout by us with the exception of some marginal parts, near which no burial or artifact was found, and which perhaps had been spread by cultivation.

Twenty-one burials were encountered, all, with one exception, apart from the earthenware deposit in the mound, and having with them no object except a sheet of mica in one instance. Badly decayed and only in part remaining, they indicated the flexed burial so far as we could determine, with one exception, a bunch. Evidence of the use of fire was present with some, as, for example, Burial No. 1, which apparently had been on the back, the knees drawn up, a space that might be expected under such circumstances intervening between the

remains of the lower extremities and remnants of teeth. Charcoal lay above where the head and trunk had been, but there was no evidence of heat on the surrounding clayey sand, of which the mound was composed.

Fig. 29.—Vessel of earthenware. Mound near Hardnut Landing. (Height 6.5 inches.)

Burial No. 8 lay alongside the pottery deposit. Near this burial were charcoal and a fireplace.

A general mortuary deposit of earthenware began near the east by south part of the margin of the mound, extending in about 14 feet and including fragments of conch shells which probably had been drinking-cups.

Nearly all the vessels, few of which were entire or were even represented by

full complements of parts, are of ordinary form, though of fairly good ware. Many are plain. In decoration the complicated stamp largely predominates. Several examples of uniform coating of red pigment were met, while the small check stamp and elementary incised decoration each are once represented. Part of a vessel that had borne a handsome, punctate design, skilfully wrought (recalling ware found by us on this river at the time of our first visit[1]), and a fragment belonging to it, lay many feet apart, thus further illustrating that the well-known ceremonial custom of breaking and scattering earthenware had obtained in this region in aboriginal times.

Two open-work vessels came from this mound, the more interesting having eight excised portions in the upper part of the body, just below the neck, which is somewhat flaring and bears a rather rude line and punctate decoration as shown in Fig. 29. Both receptacles have holes knocked through the base in addition to those excised from the body before the firing of the clay.

Two bowls each having the head of a bird as an ornament above the rim were found, and also part of a vessel that entire would be somewhat unusual, a large representation of the beak of a bird projecting from the body of the vessel, eyes being represented by perforations with countersunk margins.

Where determinable, basal perforations made after firing were noted in all the vessels from this mound.

Aboriginal Cemetery near Carrabelle, Franklin County.

About 1.5 mile north northeast from the town of Carrabelle, on the Gulf coast, is a low ridge (any elongated elevation, however slight, in this level territory is called a ridge) covered with scrub and scattered pine, having its eastern extremity almost enclosed by a small, shallow, fresh-water pond somewhat in the form of a horseshoe. This ridge is of white sand on the surface, darkened by vegetal deposit and the charcoal of fires that have spread over it. Below the white sand, which is from four inches to one foot in depth, is yellow sand of uniform shade.

For some reason not disclosed, a citizen of Carrabelle had selected this barren ridge as a likely spot to dig for treasure, and had prodded it over and put down numerous holes in it, the eastern end, where he came upon many fragments of aboriginal earthenware, being literally covered with his small excavations.

This seeker after buried treasure, not embittered by lack of success, sent us word that if we desired Indian pottery, we should search the ridge, adding how the locality could be reached.

A trench was dug by us longitudinally through that part of the eastern end of this ridge where the fragments of pottery had been thrown out and where many also had been found in place by our sounding rods.

Possibly some sherds were left by us outside of the part dug through, but

[1] "Mounds of the Lower Chattahoochee and Lower Flint Rivers." Journ. Acad. Nat. Sci. Phila., vol. XIII, p. 454.

presumably they were few in number as the central part of this cemetery on the eastern end of the ridge was entirely cleared out, and there alone deposits of earthenware of any size were encountered.

The trench, 2 feet deep, was 85 feet in length and 41 feet across at the beginning, tapering to 12 feet at the end. Also, at the middle part of the northern side of the trench, an offset at right angles was dug 25 feet wide and extending a distance of 14 feet, in order to learn if deposits of any importance had been overlooked. This, however, was found not to be the case.

Deposits of earthenware in the central part of the cemetery, and scattered sherds in the outskirts, lay on the yellow sand or in it, none deeper than 20 inches from the surface.

There was no base-line at this cemetery, nor was there any admixture of white sand with the yellow sand when the deposits of earthenware were enclosed in the yellow sand. Hence one is left in doubt how the ware could have been deposited in holes made through the present surface layer of white sand, or, as an alternative, how yellow sand could have been piled on a surface to receive the pottery, for in that case a base-line of white sand would remain.

Fig. 30.—Vessel of earthenware. Aboriginal cemetery near Carrabelle. (Length 7 inches.)

If, however, the aborigines cleared away the surface layer of bleached sand before interring the earthenware, the conditions under which the pottery was found can be understod, though we are by no means sure that this is the correct solution of the question.

The deposits of pottery found centrally in the cemetery varied greatly in size and consisted usually of piles of mingled fragments of various earthenware vessels, among which it was impossible to find nearly the full complement of any. One exception to this rule, however, was a deposit consisting of all the fragments of a vessel having two compartments communicating at the base and resting on four feet. It bears a rude attempt at trailed decoration (Fig. 30). There are three ceremonial holes, one broken through the base and one near the bottom of the outer side of each compartment.

Three small bowls found separately, each having the ceremonial hole knocked through the base, were the only otherwise entire vessels found.

The earthenware from this place is yellow, fairly hard, and tempered with coarse sand. In form nearly all the ware had consisted of bowls and pots, some of the latter fairly large and having four feet.

The decoration is almost exclusively the imprint of the basket in which, evidently, the vessels had been made. A few sherds bear the check stamp, and several have interesting punctate designs applied with considerable symmetry. A selection of sherds from this place is shown in Fig. 31.

FIG. 31.—Fragments of earthenware vessels. Aboriginal cemetery near Carrabelle. (About two-thirds size.)

In the entire cemetery but two burials were found by us, each a small pocket of calcined fragments, probably of a single human skeleton thoroughly cremated. These lay in the pottery area, but not immediately with deposits, at depths respectively of 20 and 25 inches. It is barely possible that deeper burials escaped us since the cremated remains, like some of the pottery, lay in the yellow sand and gave no evidence of being graves, through intermixture of sands of different colors that could be followed down.

None of the pottery, however, as stated, was found at a depth greater than 20 inches, though determined prodding was done which would have discovered it at a considerably greater depth and it seems unlikely that burials would be much deeper than the mortuary offerings of pottery. It is most unlikely that this cemetery, with its very numerous deposits of earthenware fragments and of scattered sherds, was made for so limited a number of interments as were found by us or could have been displaced by the previous digger, whose work in the pottery area was, of course, much less than our own. Presumably many non-cremated skeletons had entirely decayed away, as they often do.

The result of our work at this cemetery was a disappointment, in view of the number of entire vessels and of others which, though broken, were represented by all or by most of their parts, found by us in previous seasons to the westward along the Florida coast.

Mound near Old Creek, Wakulla County.

In piney woods about one mile north northwest from the landing near the mouth of Old creek, on property the ownership of which was not determined, was a rather flat, circular mound about 2.5 feet high and 50 feet in diameter of base, composed of coarse sand.

A trench 39 feet wide was dug in from the eastern margin a distance of 27 feet, tapering at the end to a width of 22 feet.

From the margin scattered fragments of pottery were encountered, and at times three or four bits together, bearing the small check stamp, a complicated stamp, or some interesting line or punctate markings, when decorated. One fragment of a large vessel shows a loop-handle with three small knobs where the loop joins the rim. Most of the fragments are of coarse ware, tempered with sand or with fine gravel.

Eleven feet six inches in, at the southern side of the trench, one foot in depth, were remains of five vessels, half to three-quarters of each being present, all showing the basal perforation. All of these are of poor quality as to ware; four are undecorated.

Near these fragments was a small bunched burial including remains of one skull. This burial and a few fragments of a femur found near the margin were the only human remains met in the mound.

An upright bowl bearing a complicated stamp decoration was the only entire vessel encountered in the digging, which was not discontinued until long after the pottery deposit evidently had been exhausted.

Mounds in Bird Hammock, Wakulla County.

This site on the Nolan estate, under control of Mr. W. H. Walker, of Tallahassee, Fla., was reached by us by landing on the west bank of Wakulla river, about two miles above the town of St. Marks, and walking inland approximately two miles in a westerly direction to Bird Hammock, over an old road used by turpentine workers. The site includes two mounds between which are various low humps and ridges, all of artificial origin.

Mound A.

Mound A, the northernmost of all, dug into superficially before our visit, was 8 feet 6 inches in height and 66 feet across its circular base. The entire eastern half of the mound, and much in addition, was dug down by us.

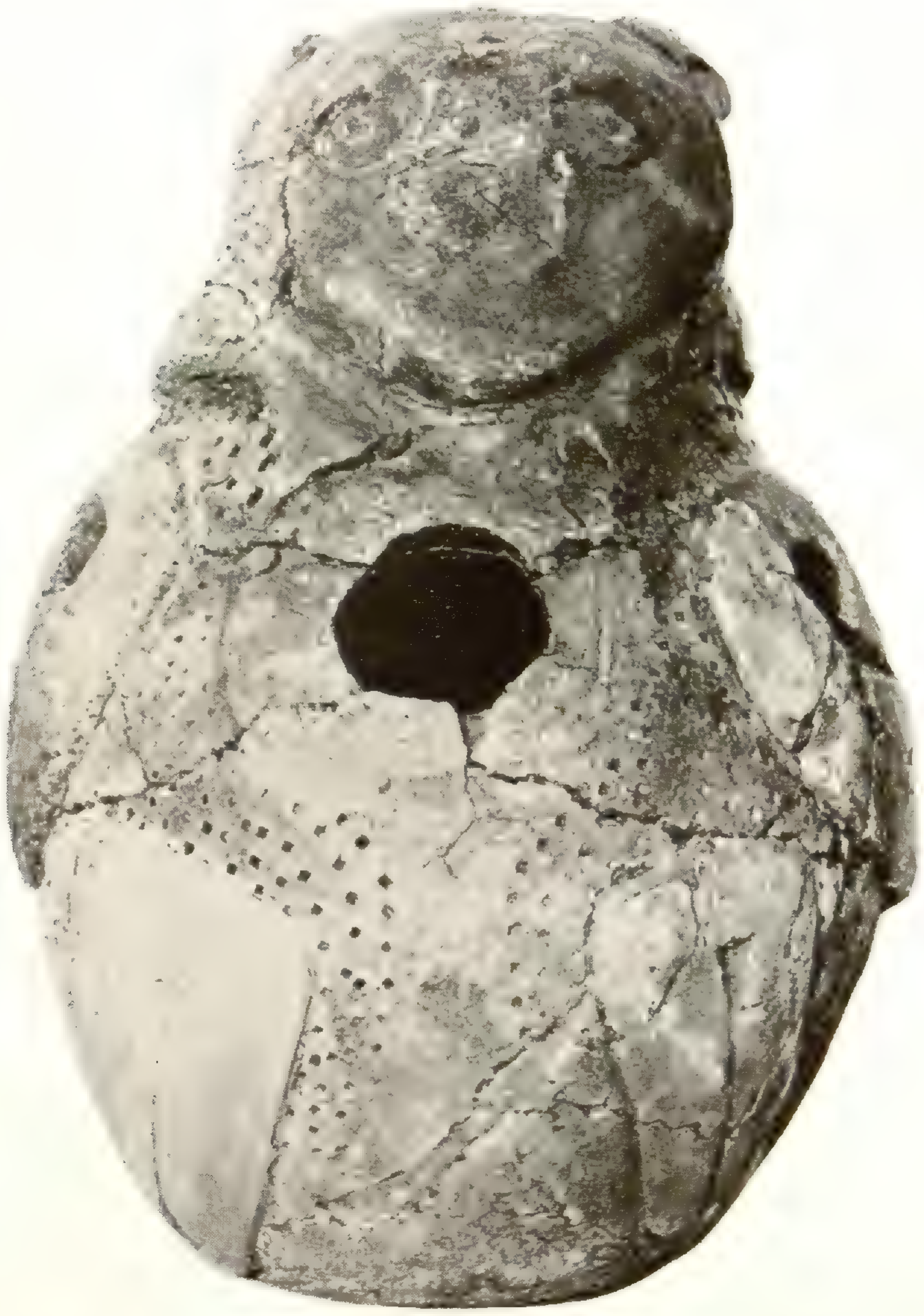


Fig. 32.—Vessel No. 8. Front view. Mound A, Bird Hammock. (Height 10.5 inches.)

Fig. 33.—Vessel No. 8. Side view.

The pottery deposit, represented by sherds at first, extended almost from the margin to the center of the mound, largely in the eastern and southeastern parts. The deposit was made up mainly of fragments of parts of vessels and of undecor-

ated ones when entire, and included in the way of decoration, the small check stamp, numerous examples of the complicated stamp, and some finely executed incised decoration, though unfortunately vessels thus adorned were not represented by a full complement of parts.

About 21 feet in was a small group of vessels, probably almost entire when interred though badly crushed when unearthed, including Vessels Nos. 8 and 9, of the "open-work" class. These, put together and restored as to missing parts by the Museum of the American Indian, Heye Foundation, New York City, are shown in Figs. 32, 33, 34, 35, 36 from photographs kindly furnished by that institution. The catalogue numbers are respectively $\frac{8}{2455}$ and $\frac{8}{2456}$.

Fig. 34.—Vessel No. 9. Front view. Mound A, Bird Hammock. (Height 9.1 inches.)

Fig. 35.—Vessel No. 9. Side view.

While the pottery deposit extended along the base, such burials as were found, fifteen in number, were higher in the mound as a rule, though one burial, found near the margin, lay with the pottery deposit. These burials were mere fragments and traces of bones, save in one instance where not far from the center of the mound was a small deposit of calcined human remains.

In sand, away from burials, found separately, were a small sheet of mica and an oblong quartz pebble showing no sign of use as a hammer, though its shape was adaptable to such a purpose.

Mound B.

About 335 yards south southwest from Mound A was another, 5 feet 9 inches in height, having diameters north and south and east and west of 56 feet and 75 feet, respectively. Two short ridges or causeways leading to the mound join it at about one-half its height, one on the southeast, one on the southwest, that on the southeast being 23 feet long by 24 feet wide, the other having a length of 38 feet and a width of 30 feet. Depressions in the soil around the mound and causeways showed whence the sand for their making had come.

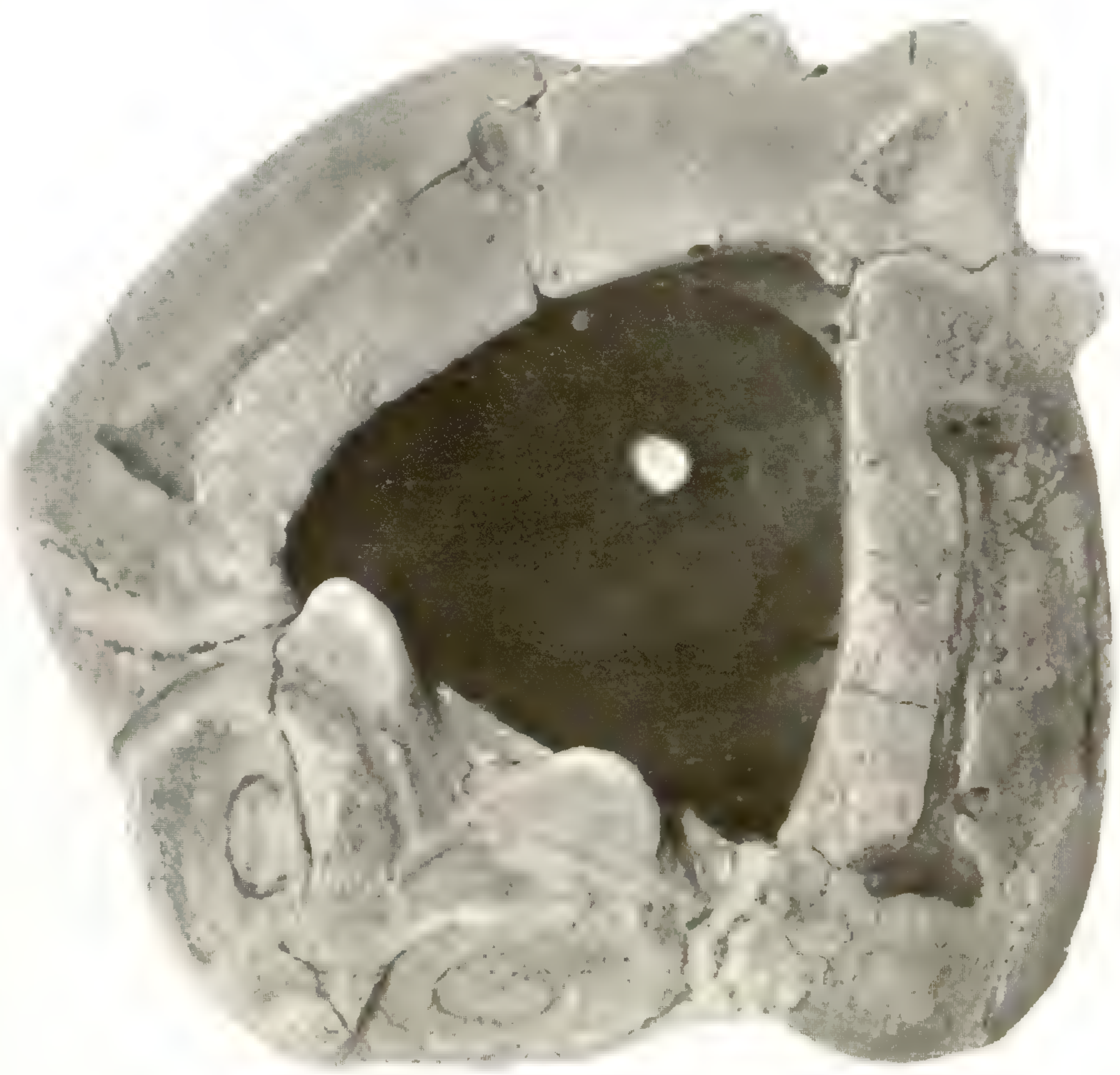


Fig. 36.—Vessel No. 9. Top view.

A trench 75 feet across at the beginning, including the eastern part of the mound, was carried in 21 feet, where it had a width of 38 feet.

There was no deposit of earthenware of the usual kind, in this mound, though sherds were fairly numerous at the margin of the excavation. Here and there, at various depths, a few vessels of inferior ware, plain or coarsely decorated, lay singly, the first being encountered 8 feet in from the margin. These vessels showed a basal perforation, as did all from this site where this feature was determinable.

The burials, fifteen in number, very badly decayed, hardly more than traces in some instances, lay at various depths in proximity to the earthenware vessels, but not immediately with them. In one instance a bunched burial having remains of four skulls was indicated.

Contrary to the general rule in this region, some artifacts had been placed with the dead.

Burial No. 4, fragments of a skull, had with it a rude lancepoint of flint, 5.25 inches long; an arrowhead of inferior workmanship; two bits of flint, probably knives; a small sandstone hone.

Burial No. 5, parts of a skull, had in association three hones of sandstone, also three fragments partly worked, twenty-eight flakes and chippings, seven implements shaped in part, three portions of arrowheads and lanceheads, six rude arrowheads and knives, one lancehead 4 inches in length, all of flint.

Dissociated when found, though burials originally with them may have decayed away, were: nineteen quartz pebbles, more or less round; a hone of fine-grained ferruginous sandstone.

Curiously enough, though vessels and sherds in this mound were notably of inferior quality, one exception, a large fragment of good ware, bore an interesting design in red and in white pigment.

The humps, rises, and low ridges between the two mounds proved to be places of abode, the sand being black from admixture of organic matter and containing quantities of marine shells, mainly of the oyster, fish-bones, fragments of turtle-shell, bits of earthenware, etc., and being without burials so far as investigated.

Site on the Lewis Place, Taylor County.

In 1902 we visited the Aucilla river, lying anchored in the Gulf outside the river's mouth, not venturing in with our steamer owing to the number of limerocks present near the entrance and in the bed of the stream, but entering with the aid of bateaus.

This season the possession of a motor launch gave us access to sites farther up the stream than we had been able to visit before, our investigation, however including the Lewis Place (the owner, Mr. B. F. Lewis, residing there), described in our earlier report.[1] At the time of our first visit the mound at this place, then in part occupied by a small stable with an enclosure, yielded very interesting pottery from the eastern part exclusively. It was also found to contain, where dug into, burials unaccompanied by artifacts, but in many instances interred under masses of limerock of the kind found along the coast, beginning at St. Marks and continuing down a long distance.

This year, finding the stable and its appurtenance had been removed, we dug the mound completely.

Fifty-two burials were encountered, including the flexed, the bunch, skulls apart from the rest of the skeleton, all forms of burial in the main similar to those found at the time of our first visit, though the proportion of flexed burials encountered was much greater in the later investigation.

There were also several burials of parts of skeletons.

As noted before, some of the burials lay under masses of limerock, others being without them.

No burials of children were found at the first investigation, while five were unearthed at our second visit, including one of considerable interest. In a shallow grave, 7 feet from the surface, about in the center of the beginning of the mound, as was clearly shown by the sharp curve of strata piled over it, but not exactly at the center of the base of the completed mound, was the skeleton of a child of about eight or ten years, lying under masses of limestone. Apparently we have here the nucleus of an important mound 64 feet in diameter and 6.5 feet in height, containing only the skeleton of a child.

One burial (Number 15) closely flexed face down, knees to the right, had charcoal in association and one side of part of the pelvis colored with red pigment. The skull of this skeleton was the only one to be saved from this place.

[1] *Op. cit.*, p. 323, *et seq.*

At our first investigation no artifacts were found with the dead. At our second visit, however, while the absence of artifacts might still be considered a general rule, there were exceptions to it, as follows:

Burial No. 19, closely flexed to the right, had at the feet an undecorated bowl with the usual mutilation, and the remains of a shell drinking-cup.

Burial No. 35, flexed to the right in a shallow grave 7 feet below the summit-plateau, unaccompanied by masses of rock, had at the right knee a small arrow-head or knife, of flint, whose presence possibly was adventitious.

Burial No. 40, closely flexed to the left, having with it two other skulls and a few other bones, without masses of limestone, had a shell drinking-cup with the mortuary mutilation in the base.

About half a dozen parts of vessels in fragments, and piles of sherds from various vessels, were found singly in different parts of the mound in the second investigation, and a pot (Fig. 37), square in cross section, having a complicated

Fig. 37.—Vessel of earthenware. Mound on the Lewis Place. (Height 4.1 inches.)

stamp decoration around the neck, came from about where we discontinued our digging at the time of our first visit.

FIG. 38.—Image of earthenware. Side view.

Near one side of our former digging and well in the eastern half of the mound, evidently belonging to the general deposit of earthenware found at the time of our first visit, near together, were numerous sherds and a number of vessels, some having parts missing. These vessels were in the main uninteresting, being undecorated or having only bands of complicated-stamp decoration below the rim. One, however, is worthy of particular description.

Beneath a mass of limerock lay a vessel in fragments, none of which was missing. These parts, carefully put together, formed by far the best human effigy-vessel we have seen from the Florida coast, though this is not high praise, the region, as is well known, not furnishing remarkable vessels of this class. The image, shown in Plate XVI, and in profile in Fig. 38, wears a kind of breechclout and seems to be bearing a pack. In the base is a hole made prior to the baking of the clay.

So far as determined, all vessels from this place, except the effigy, had been "killed" after the baking of the clay.

Eleven arrowheads and knives, of flint, and various parts of others, also numerous flakes of the same material, were found separately in the mound apart from burials. Also dissociated were found: nearly half a banner-stone of the butterfly type, of quartz so highly polished that

MOUND ON THE LEWIS PLACE, EFFIGY OF EARTHENWARE. (FULL SIZE.)

it reflects the rays of the sun; an awl of bone; several rude cutting implements or wasters of flint; a sheet of mica.

In all directions near the landing at the Lewis Place, the ground gives evidence of former aboriginal occupancy, and discovery of several objects of interest in it are reported by Mr. Lewis.

In a field near the Lewis home, a short distance from the landing, was a low rise of sand blackened by organic matter, in which trial-holes came upon thirteen closely flexed burials and three disturbances.

The absence of artifacts with the dead, so marked in the mound at this place, was noticeable also in the rise, though there was no general deposit of pottery or of masses of rock with the burials. There were, however, two exceptions. With a skeleton closely flexed to the right was a celt, seemingly of eruptive rock, 8 inches in length, a beautiful specimen carefully ground at the edge and rounded and dressed at the poll. This hatchet lay parallel to the skeleton at the outer side of the right forearm, the left forearm crossing the body to the implement. With another burial was an object of limestone, flat, almost oblong, without perforation, 3.5 inches in length, having a blunt edge.

A bone awl, a sheet of mica, a lancehead of flint, and several unfinished implements of the same material were found apart from human remains.

A number of other places visited by us on the Aucilla river proved to be only aboriginal dwelling-sites, yielding nothing of interest.

Mound near the Warrior River,[1] Taylor County.

About one mile up Warrior river are some frame buildings known as the Fish Camp. Following the road out from this Fish Camp for a mile approximately, one comes to a mound in sight from the road, in scrub growth and pine, about 4 feet high and 48 feet in diameter, said to be on railroad land.

Ten large trial-holes, all greatly extended, ultimately including much of the eastern part of the mound, came upon four burials.

Burial No. 1, fragments of a skull and of a humerus, near the center of the mound.

Burial No. 2, fragments of bones, having about 2 feet distant and perhaps not connected with them: a sheet of mica; three small, undecorated bowls; part of a compartment vessel having had at least four divisions, only two of which, however, remained entire.

Burial No. 3, a skull, femur, tibia, all in fragments and not in order.

Burial No. 4. Centrally, with a sheet of mica, was a skull near a small

[1] In 1902 we visited this river and investigated two fine mounds in its vicinity. *Op. cit.*, p. 331, *et seq.*

The Warrior river we believe to be the southernmost limit of the Florida coast where deposits of earthenware were interred in the eastern part of mounds for the dead in common. Farther down, individual deposits of artifacts, if any, are to be expected.

excavation made by some previous digger, which may have disturbed other parts of the burial.

Apart from human remains, separate, were three sheets of mica and a rude bowl.

No earthenware found in this mound had the basal perforation.

Mounds on Hog Island, Levy County.

Hog island lies on the Gulf Coast between mouths of the Suwannee river. That part of the island on which the mounds are is owned jointly by Messrs. B. A. Thrasher, of Gainesville, Fla., and J. L. Robison, residing on the island.

The mounds are on hammock land about three-quarters of a mile northeast from the first high land up Hog Island creek, in connection with a considerable shell deposit.

One, on the shell ridge, having a diameter of 40 feet and a height of about 3 feet, had been dug into to some extent by others. Investigation by us indicated it to be of shell covered with sand to a depth of about one foot in which were burials, the bones badly broken, some by previous disturbance, others probably owing to roots of the scrub palmetto that were thickly interwoven in the mound.

Nearby was a somewhat larger mound that had been considerably dug into centrally. Seemingly it had been similar in construction to the smaller one, with the addition of some masses of limerock.

Another mound on Hog island was visited by us in 1902.[1]

Mound in Cedar Keys, Levy County.

In the town of Cedar Keys, alongside the road bordering the water and near the great shell deposits there, is a mound on the property of Mr. W. H. Hale, of Cedar Keys. This mound, about 7 feet high and having diameters of 73 and 32 feet at present, is largely of sand, though some shell is found in it in places. On the side toward the water, however, Mr. Hale informed us, much shell was hauled away for use on the streets of the town, thus accounting in part, at least, for the difference in diameters. On the water side shell must have predominated in the mound.

Much digging by others before our coming had been done in the mound, and we were shown several celts and told of others and of quantities of shell beads, celts and beads all said to have been found superficially in the mound, or, in the case of some of the beads, to have been washed from it.

Three excavations, 6 by 3.5 feet, 6 by 4 feet, 16.5 by 6 feet, were put down by us centrally in the mound to its base, a depth of 7.5 feet, all passing through sand in the main, though shell was encountered in comparatively small quantities.

About one foot down fragments of human bones having belonged to different individuals were encountered, probably a recent disturbance.

[1] *Op. cit.*, p. 348.

Five feet down a graceful celt, apparently of sedimentary rock, was found, 7.5 inches in length.

About 8 inches below and 1.5 foot away from the celt was a thigh bone and part of the base of the skull of a child, accompanied by a number of shell beads.

Five feet eight inches down, apart from bones, was a fragment of an ornament of sheet-copper.

Aboriginal Cemetery in Cedar Keys, Levy County.

In the town of Cedar Keys, in a large vacant lot, about 150 yards in a southerly direction from the principal school-house of the place, a large, brick edifice, is an aboriginal cemetery in ground on property controlled by Mr. W. R. Hodges, of Cedar Keys. This cemetery had been dug into to a considerable extent prior to our visit, though much of it remained intact. Remarkable stories of the discoveries made at the time of the earlier digging were related to us and of various interesting vessels accompanying the burials. So plentiful were the relics, it was said, that objects of interest actually had been dug out with spoons by persons living nearby. On our return to the North we addressed the Buffalo Society of Natural Sciences, of Buffalo, N. Y., for whom the work had been done, and most courteously were forwarded by Mr. W. L. Bryant, Director of the Society, who had participated in the investigation, details of the digging in the cemetery and, in addition, his illustrated catalogue, a very interesting book, and a large number of photographs of objects, mostly pottery, discovered in the cemetery.

Fig. 39.—Vessel of earthenware. Aboriginal cemetery, Cedar Keys. (One-half size.)

The pottery from this place presents no marked novelties though it includes specimens of the interesting incised decoration found in this region, an example of which, selected from the photographs sent by Mr. Bryant, is shown in Fig. 39. The projection of the decoration, also furnished by Mr. Bryant, appears in Fig. 40.

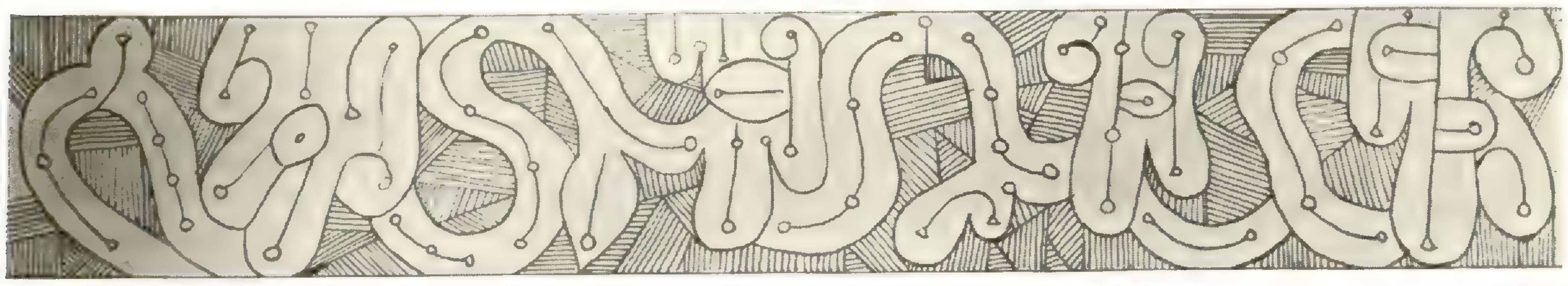


FIG. 40.—Projection of decoration. Vessel of earthenware. Cedar Keys.

An interesting pendant[1] of diorite, in the form of a duck's head, also was found by Mr. Bryant in this cemetery.

A portion of the unexplored part of the cemetery was dug through by us. In addition to several disturbances, aboriginal or recent, we came upon eleven skeletons, closely flexed, partly flexed, at full length, none having a skull in condition to save. Eight of these burials lay in sand, each having above it a deposit of shells, indicating that interments had been made in graves which were then filled with shell almost to the surface.

At one part of the cemetery a general shell deposit was reached, which, however, was not apparent above the level. Three burials were found in that portion of this shell deposit explored by us, and these lay entirely enclosed in shell.

FIG. 41.—Fragment of earthenware. Aboriginal cemetery, Cedar Keys. (About two-thirds size.)

[1] Our Academy possesses a cast of this rare piece, presented to it by the United States National Museum.

No artifacts lay with any of the burials found by us, and but two or three bits of pottery were encountered in all our digging. One of these, however, is of excellent ware, bearing an interesting incised decoration, perhaps including the well-known step design (Fig. 41).

It is evident from the results of the Buffalo Society's digging and from ours that the aborigines had used one part of the cemetery in which to place burials with mortuary deposits and had selected another part to make interments without such deposits.

Aboriginal Site on Crystal River, Citrus County.

In two reports[1] we have described our investigation of the aboriginal site at the great shell mound[2] on the bank of Crystal river, about two miles from its union with the Gulf.

This site, belonging to Mr. and Mrs. Robert J. Knight, of Safety Harbor, Fla., through whose kindness all our investigations in it have been made, included as one of its component parts, as may be seen in our earlier and more complete reports on the subject, some flat ground and a rise culminating in a mound, all surrounded by an irregularly circular embankment of sand having a maximum height of about 6 feet.

The rise and the mound, entirely dug away by us during our former visits, yielded a rich harvest, consisting mainly of ornaments of copper, of shell and of stone, including several beautiful charm-stones of rock-crystal and one of amethystine quartz, a veritable gem.

In the enclosing embankment, dug into but to a very moderate extent at the time of our two previous investigations, a few burials, none accompanied by artifacts, were found.

The contrast between these burials in this respect and many of the burials in the mound and in the rise, was so marked that we determined, this season, to revisit the site in order to make a more thorough examination as to this subject.

In the southern portion of the embankment, which included its highest part, much digging was done, showing that part of the embankment to be constructed, not of white sand such as is found in the neighborhood, but of sand evidently darkened by admixture of organic matter and containing marine shells here and there, bits of pottery, other midden debris, and numerous scattered fragments of human bone, sometimes only a single one lying alone. Evidently the material for the embankment had been gathered from a dwelling-site.

Burials were numerous in the highest part of this southern portion of the embankment, nearly every trial-hole in it coming upon at least one burial (5 feet being the maximum depth), and were found here and there in other parts of it.

[1] "Certain Aboriginal Mounds of the Central Florida West-Coast." Journ. Acad. Nat. Sci. Phila., vol. XII, pages 379–413. "Crystal River Revisited." Journ. Acad. Nat. Sci. Phila., vol. XIII.

[2] Locally known as the Spanish mound, though, of course, Spaniards had no connection with its origin.

In all twenty-four interments were unearthed, and, in addition, many skeletons parts of which had been cut away in making other graves, and bones which seemingly had been gathered up and thrown in when the embankment was made.

The form of burial was either flexed or at full length on the back, some burials being under a layer of shell.

It was impossible to determine whether the interments had been made from the present surface of the embankment or in various stages of its construction, all the material being homogeneous. One burial extended about a foot into pure, white sand underlying the embankment. In this instance, at least, the interment had been made in a grave whose limits, however, we could not trace above the white sand.

With the burials were artifacts as follows:

Burial No. 5, extended on the back, had, at the outer side of the left shoulder, a small charmstone or pendant of shell.

Burial No. 6, partly flexed to the right, was accompanied by a shell tool, probably a chisel.

Burial No. 8, aboriginal disturbance, to some extent put in disorder by another burial. Under the upper part of the thorax was a drinking-cup made from a conch (*Busycon*), having a ceremonial hole knocked through the base. This cup was covered by a large fragment of pottery.

Burial No. 11, partly flexed to the left, had below it and crushed against it a skeleton of a child. Possibly at the neck of the adult, or perhaps belonging to the child, were four pendants of shell and one of limestone. With these was a gorget of shell having a large, central, circular excision and rude, incised, concentric circles on the convex side.

Under the knees of the adult was a mass of sand tinged with hematite, in which were bits of sandstone and two rude pendants, one seemingly of sedimentary rock, the other of limestone.

Burial No. 15, partly flexed to the right. Along the right forearm was an implement of bone.

Burial No. 21, partly flexed to the left, had at the thorax an arrowpoint of flint.

About 6 inches below an aboriginal disturbance were three rude limestone pendants and two of shell, all erect and grouped closely together, the grooved ends uppermost.

Apart from human remains were a number of pointed implements of bone, two shell pendants, a pendant of limestone, a shell drinking-cup having the mortuary mutilation, a gouge made from part of the body whorl of a marine shell, a number of columellæ of the conch wrought into chisels.

Considerable, though not exhaustive, digging in the remainder of the embankment, most of which was decidedly lower than the southern part, failed to come upon burials, as was the case in our previous search.

In consequence of this latest investigation at the Crystal River site it be-

comes evident that the few objects found, though showing that the burials in the embankment were not absolutely without mortuary deposits, nevertheless emphasize the discrepancy between the burials in the embankment and those found in the rise and in the mound as to abundance and quality of such deposits, and indicate that the embankment, or that part of it containing burials (the increased portion of the southern part), was made at a different time from that of the interments within the enclosure when a much greater liberality as to gifts to the dead prevailed.

About one mile in a northerly direction from the Spanish mound, on hammock land, is a mound of very irregular shape, having a large circumference and a maximum height of 6.5 feet. Extensive digging showed this mound to be of white sand without discoloration and indicated it to have belonged to the domiciliary class.

Mound on the Greenleaf Place, Citrus County.

About 3.5 miles in a southerly direction from the town of Crystal River, on hammock land on the Greenleaf Place, now belonging to Mr. J. K. Eubanks, of Crystal River, is a mound that had been greatly dug into before our investigation of it. Human bones lay in many places on its surface. Its diameters were 70 feet and 50 feet. Its original height probably had been about 4 feet, though burials were found at a greater depth than that. Whether these burials lay in graves, however, it was impossible to determine, as there was no definite base-line, and the sand underlying the mound seemed the same as that of which the mound itself was composed.

Trial-holes put down in such parts as seemed to have escaped earlier digging reached eight burials, all of the bunched variety, some representing but a small part of a single skeleton. With one burial, however, were two skulls, while three were found with another.

Burial No. 5, consisting of fragments of two femora, one tibia, and one humerus, parts of a skull lying two feet from the rest of the burial, had with it one sheet of mica and a small quantity of sand tinted a pale pink with admixture of powdered hematite.

Two arrowpoints of flint were found separately apart from burials, and two charmstones, which probably had been together, lay in sand thrown out from one of our trial-holes. These objects are now in the Museum of the American Indian, Heye Foundation, and through the courtesy of Mr. George G. Heye they were submitted to Prof. Charles P. Berkey, of Columbia University, who kindly has determined their material as follows: Museum No. $\frac{8}{2054}$. Igneous, of basic composition, about that of basalt. Probably occurs as a dyke or sill and would be classified as a "trap" or diabase.

Museum No. $\frac{8}{2055}$. Metamorphic sediment. Exact composition obscure,

but very complex. May have been associated closely with such rock as the other sample. Would be classified as a "graywacke" (which is a species of metamorphosed, very impure, grayish green sandstone).

Aboriginal Sites near Golden Lake, Mississippi River. Site at Evadale, Mississippi County, Arkansas.

In the village of Evadale, about 2 miles in, following the road from Golden Lake Landing, on property of Mr. Peter Notgrass, Mr. M. J. Blackwell, lessee, both of Evadale, is a site on which is considerable midden debris. This site, a ridge in part covered by dwellings, has been, we were informed, in common with other sites near Golden Lake, prodded and dug by Crowfoot, the Indian, for the last twenty years.

After a careful examination of this place, in which four skeletons at length were found, all badly prodded and two having the skulls (and presumably accompanying earthenware) removed, we discontinued work, convinced that while the reputation of the place lingered, its pottery had departed. Our only discovery with the remains was an imperfect vessel of commonplace form.

Several other sites near Evadale, kindly put at our disposal by Mr. Notgrass, were not investigated by us, as they had shared the attentions of Crowfoot, and doubtless of others, equally with the one visited by us.

Site near Bassett, Mississippi County, Arkansas.

On property belonging to Mr. Charles M. Bell, living nearby at Bassett, Ark., is an aboriginal dwelling-site about 4 miles inland from Golden Lake Landing, reported to have been thoroughly searched by wielders of the prodding iron, including the indefatigable Crowfoot.

We were courteously permitted to dig in a spacious enclosure in front of the dwelling on the property occupied by Mr. A. S. Catching, Mr. Bell's son-in-law, which had been refused to Crowfoot, though some digging had been done in it by members of Mr. Bell's family.

Seven hours' digging with four men yielded six skeletons from this enclosure and one from a field behind the house. These burials consisted of five adults extended on the back, and two children, the deepest 3 feet 8 inches down.

Burial No. 1, a child, having at the left shoulder an undecorated bottle and a bowl with rude animal head and conventional tail on opposite sides.

Burial No. 2, adult. At the right forearm were an undecorated bowl, and a bottle having in relief, surrounding the base of the neck, a symbol so well known on the pottery of this part of Arkansas and figured by Holmes[1] and by us in various publications.

A fine bracket-shaped ear-plug of shell, having a perforation at the end of the shank to aid in attaching it, lay in place at each side of the skull.

Across the lower part of the thorax lay an object of elk antler, about 10 inches

[1] William H. Holmes. 20th Ann. Rep. Bur. Amer. Ethn., Plate XIII f.

in length. This object, which has been carefully smoothed, has a perforation near the proximal end, through which apparently a pin of bone or of antler, has been, a part remaining filling the perforation. This interesting object, submitted by us to a high authority who, it was hoped, might determine its former use, was lost in transit by the express company.

Burial No. 3, adult, having shell beads at the neck, some as large as the end of a human finger, had near the skull an undecorated bottle and two broken mussel-shells lying near it.

Burial No. 4, adult. At the left humerus were fragments of mussel-shells and a small sandstone hone; over the left shoulder was an undecorated bottle.

Burial No. 5, adult, had been discovered by prodding previous to our coming, and the skull, presumably with accompanying pottery, had been removed.

Burial No. 6, a child.

Burial No. 7, an adult, the skull of which was saved. Above the skull was a pile of fragments of a bottle which had borne in relief a symbol similar to the one to which reference has been made in connection with Burial No. 2. These fragments evidently had been tossed in when the skull, which showed evidence of prodding, had been dug down to by some pot-hunter who, finding the vessel badly broken, had not cared to take it away. It has been cemented together, with some restoration, and with everything found at this place except the object of antler, has been presented by us to the Royal Ethnographical Museum, Stockholm, Sweden.

Mounds near Transylvania, East Carroll Parish, Louisiana.

About 2 miles in from the Mississippi and in sight from the railroad station at Transylvania, on the extensive property of Messrs. Helgason Brothers (T. A. and E. B. Helgason) of Vicksburg, Mississippi, is a group of four mounds and two humps, of clay, all near together, as shown on the plan (Fig. 42) from a survey made by Dr. M. G. Miller at the time of our visit, the humps doubtless remainders of mounds once somewhat larger.

The mounds, evidently at one time of the usual domiciliary shape found in southern United States (quadrangular with spacious flat tops) are now of very irregular outline through trampling of cattle and mules, wash of rain, and erosion of the basal parts in periods of flood in earlier times, though of late, we were informed, the land on which the mounds are, being somewhat higher than the surrounding terrain, has been but little affected when the levee has given way.

The extensive wash of water to which the mounds have been subjected, while destroying their symmetry, has been an aid to investigation, inner parts formerly now being superficial, and gullies and channels, some as much as 8 feet in depth, having been cut in places along the sides.

A careful search over exposed parts showed a few fragments of human bones on Mound C (see plan), and here and there on the group small bits of earthenware almost invariably undecorated and resembling the somewhat inferior ware of

vessels intended for culinary purposes. Also on Mound C and elsewhere were numerous small masses of burnt clay, some evidently from wattle-and-daub erections destroyed by fire, as they bore imprints of reeds or of twigs.

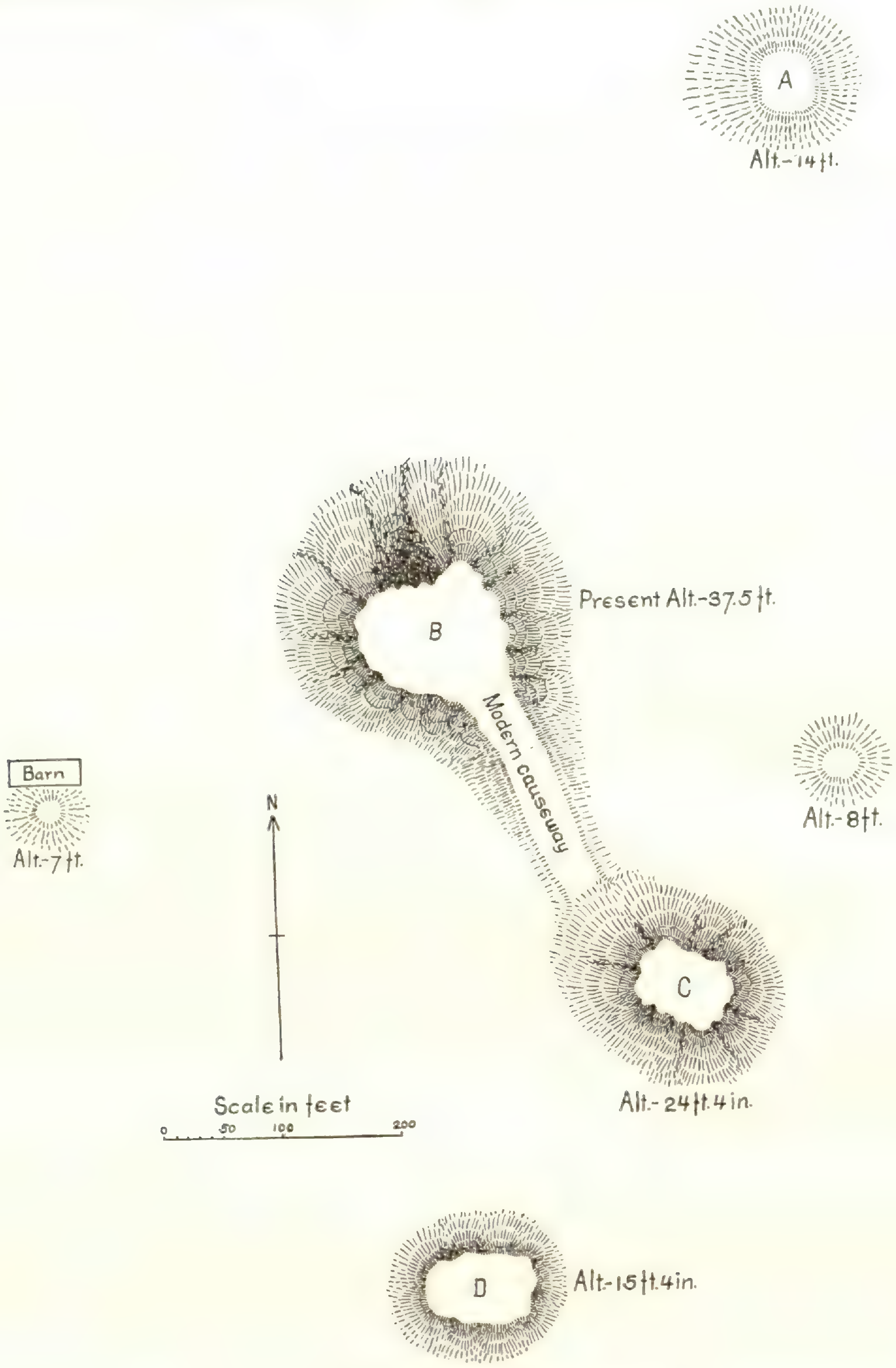


FIG. 42.—Plan of mounds. Transylvania, La.

There is no history of the discovery of any Indian relics in plowing on this place, and boys living on it knew nothing of arrowheads of flint, so numerous on some

aboriginal sites. Doubtless, however, fifty years ago prehistoric objects were plentiful enough here on the surface and in the furrows.

In 1911 we visited the Transylvania group of mounds and were much impressed with the height of one (Mound B). On our return (the winter of 1917) to survey the site, the members of the party who had seen the mound before were nonplussed to find it of much more modest proportions than they had supposed it to be, and were far from flattered at their apparent inability to estimate heights.

Later, however, Mr. J. A. Helgason, son of one of the owners of the estate, informed us that in 1912 a force of men and teams ordinarily used in work on the levees, had been transferred to Mound B, whose height had been reduced thereby about 20 feet to supply material to construct a causeway leading from the ground to the present top of the mound, to enable stock to reach the summit in case of serious overflow from the river, the sides of the mound having become almost perpendicular through wash of rain. Incidentally Mr. Helgason said that some pottery in fragments had been found during the work.

In but two of the mounds was there considerable area of summit plateau intact, namely on Mound D, where the clay had an unpromising appearance and where trial-holes were unsuccessful, and on Mound C, where the soil was dark in shade and was interspersed with small masses of clay reddened by fire to a depth ranging between 3 and 4 feet.

Here three burials were found, all reached by one trial-hole, one flexed and two extended on the back, the flexed burial having two vessels in association. One, a bowl of excellent black ware having a small, flat, circular base, bears an incised decoration of fair execution. This bowl lay inverted over another, of inferior ware, having scanty, incised lines by way of ornament.

The upper bowl, only an average example of the excellent pottery of the lower Mississippi valley, which at its best includes specimens excelling in quality of ware, in grace of form, and in beauty of incised decoration, has been presented to the Museum of the American Indian, Heye Foundation, New York City.

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